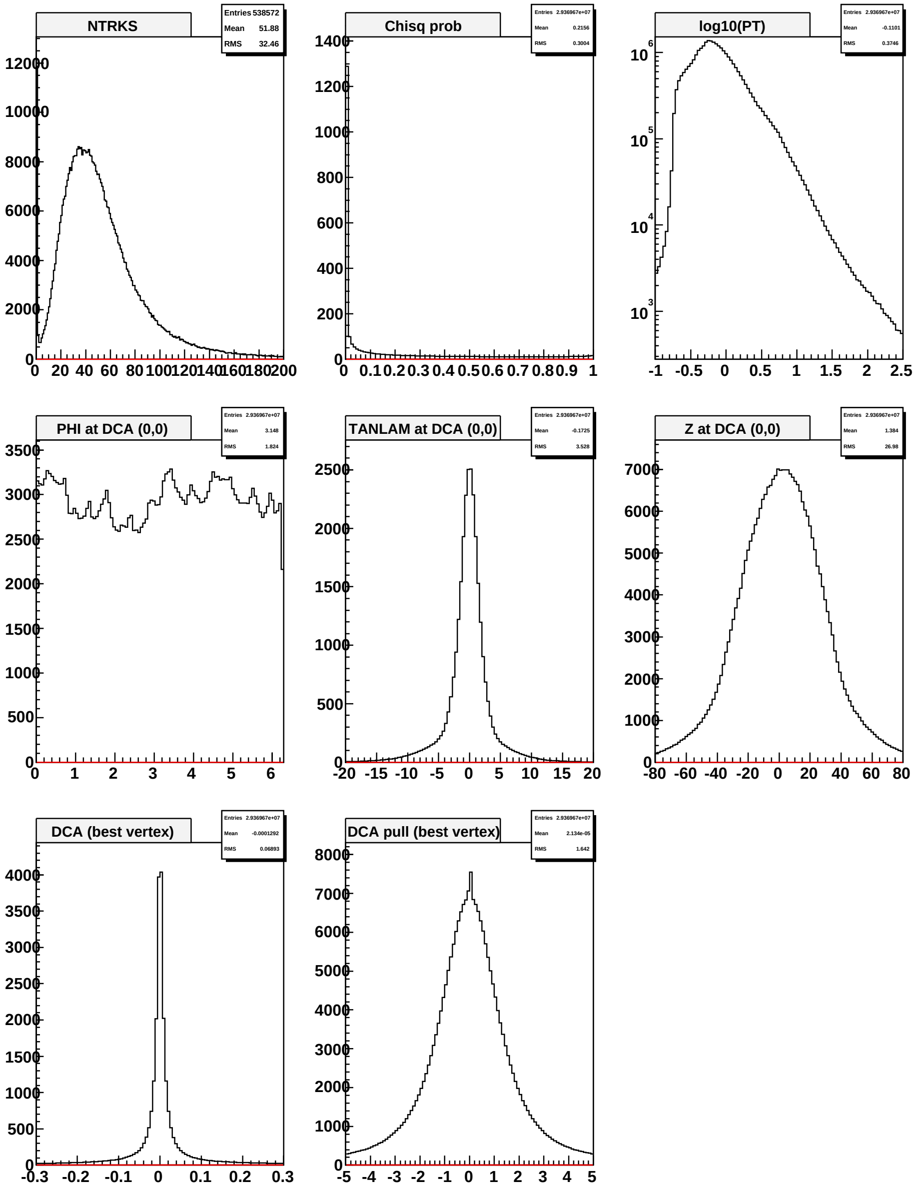
Description of RecoCert plots

April 20, 2005

Contents



Tracks (All)

Tracks (All)

NTRKS

Number of tracks reconstructed per event. The number of entries is the number of events analyzed by RecoCert. In Reco p14 this has a peak at 40 tracks.

Exchange 10-Apr-2003:
Question (HTD): Why the 1000 event peak at zero?
Answer (DA): Zero or Min-Bias Events make this spike.
Comment (HTD): 5% of the events! I checked run 175135 to see how many events came in on triggers called Min_Bias + Zero-Bias. I found 2.9%. If I include mu1ptxatxx that goes up to 4.2%.

Chisq prob

This is calculated by RecoCert from the GTRK refit chi-sq and the number of degrees of freedom. In p13.06 it is peaked at zero because the chi-sq per degree of freedom is in the neighborhood of 1.1. It should be flat if error analysis is correct.

log10(PT)

The log(pT) of all tracks in a log scale plot. It extends from 10^-1 to 10^2.5 GeV/c. It seems to peak at about -0.3.

PHI at DCA(0,0)

Phi is normally defined with 0 degrees pointing east. The charged particle tracks are curved so their direction in phi depends on the position along the track. It is plotted here at the DCA (distance-of-closest-approach) to the vertex. This plot is expected to be flat.

Exchange 11-Apr-2003
Question (HTD): Why is it not flat?
Answer (DA): The CFT will be responsible for some dip from 36-180 degrees. We hope this effect goes away when we move the CFT timing today. The other structures look like they might be SMT overlaps ... (the phi regions where there are 2 pieces of Si in the same layer) but that is just a guess.
15-May-2003
Question (HM): Could the dip reflect the beam offset?

TANLAM at DCA(0,0)

Lambda is pi/2-theta. Theta is the angle off the beampipe on the positive-z side. Thus tanlam=0 is eta=0.

Exchange 15-Apr-2003
Comment (SC): For axial-only tracks tanlam has been set to some off-scale value.

Z at DCA(0,0)

The Z-position of the track DCA in centimeters. Negative-Z is towards the north. The RMS is roughly 22 cm and the distribution is symmetric in my example plot.

Exchange 10-Apr-2003
Comment (HTD): There is a spike at zero in Reco p13.06 but not in Reco p14.01.

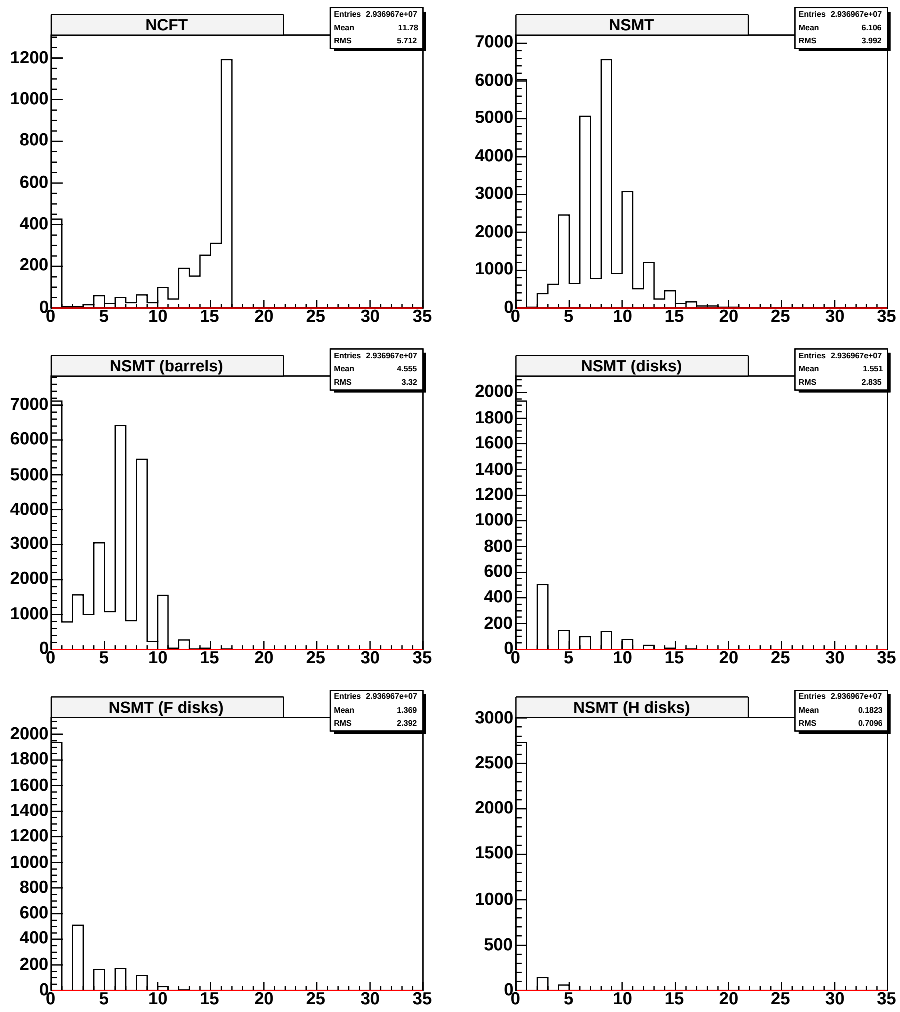
DCA (best vertex)

Tracks distance-of-closest-approach. There are three kinds of DCA. DCA(0,0) is the closest approach to the z-hat axis. There is a DCA to the primary vertex as chosen by Reco. Then there is the DCA to the closest vertex to the track as determined from dist./unc'y.

```
Exchange 10-Apr-2003
Question (HTD): What are the units?
Answer    (SC): CM.
```

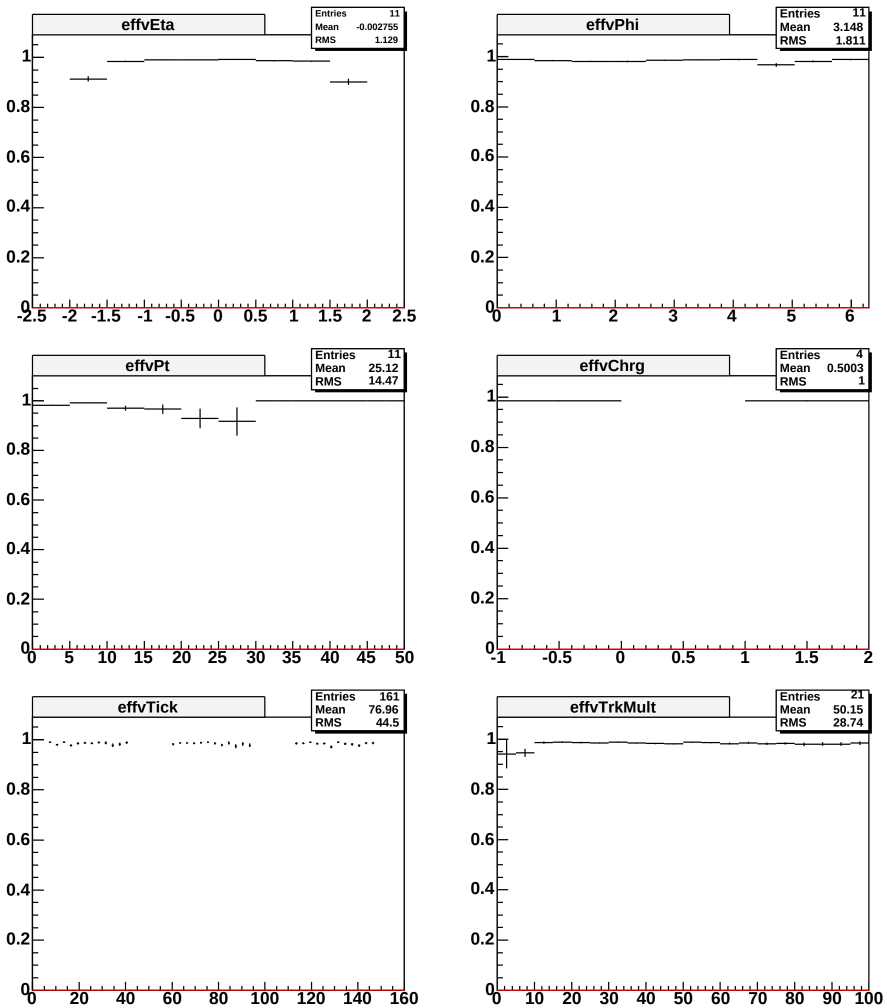
DCA pull (best vertex)

For each track plot DCA/resolution track parameters. Should have a width of 1.0 for track except those with long-lives. It's sensitive to misalignment and to tracks due to noise.



Track Hits (All)


```
Hits On Tracks (All)

NCFT
-----
The number of CFT hits.  It peaks at 16 because there are 8 doublet layers.
Some SMT-only tracks have no CFT hits.

Exchange 15-May-2003:
Question (HTD): Why does the statistics box indicate what seems to be far
    more entries than is the sum of the bins in the histogram?
Comment   (HM): Maybe a bug in combining the histograms. Will check.

NSMT
----
The number of SMT hits. The SMT is mostly double-sided but there
are single-sided layers.  Some CFT-only tracks have no SMT hits.

NSMT (barrels)
--------------
It seems tracks hit 0, 3-doublet, and 4-doublet barrels most frequently.

NSMT (disks)
------------
The disks are perpendicluar to the beampipe.  The sum of F-disks and
H-disks makes up this plot.


NSMT (F disks)
--------------

NSMT (H disks)
--------------

Exchange 15-May-2003:
Question (HTD): Why so few H-disk hits? I thought there were more forward
   tracks.
```



Tracking (Efficiency-Isolated)

Tracking Efficiency Isol

Erich Varnes describes this page. "Efficiency is simply the fraction of muons that have a charged track pointing near them. I'm not sure how much Harry has modified what I've done (he's at least added the effVsTick plot)." His muon definition is essentially "Tight" (see descriptions of muon id) with some scintillator time cuts and pT > 2 GeV. Erich defines "near" as being within 0.15 in phi and theta.

Isolated muons.

effyvEta

Exchange 15-Apr-2003:
Question (HTD): What is the reason the eff'y is lower forward, peaks at |eta|~1.2, and is lower at eta=0?
Answer (EV): Low forward makes sense, in that we begin to lose layers of the CFT, making tracking more difficult. The peak at eta of 1.2 is a little harder to explain. Part of it may be the "random track overlap" effect I mentioned earlier. Since I defined matching using theta rather than eta, the odds of a random track pointing toward the muon increases as one moves forward.
In my latest versions of the plots (using p14 tracking and correcting bin-by-bin for random overlaps) the peaks are less noticable. To the extent that they remain, they are an indication that tracking in the CFT-dominated/SMT-dominated transition region is better than in the central region.

effyvPhi

This should be flat.

effyvPt

Exchange 15-Apr-2003:
Question (HTD): The shape of this distribution is typical. Does the efficiency really go down with pT?
Answer (EV): I'm not sure. Statistics do get sparse out at high pT, and it's possible that the fraction of muons that are from cosmics becomes significant. The dropoff with pT was certainly much more dramatic before I put in the muon timing and z0 cuts to supress cosmics.
The bottom line, though, is that this is more likely to be an artificial effect rather than a reflection of the tracking performance. If there are other cosmic-supression cuts I could try, please let me know.

effyvChrg

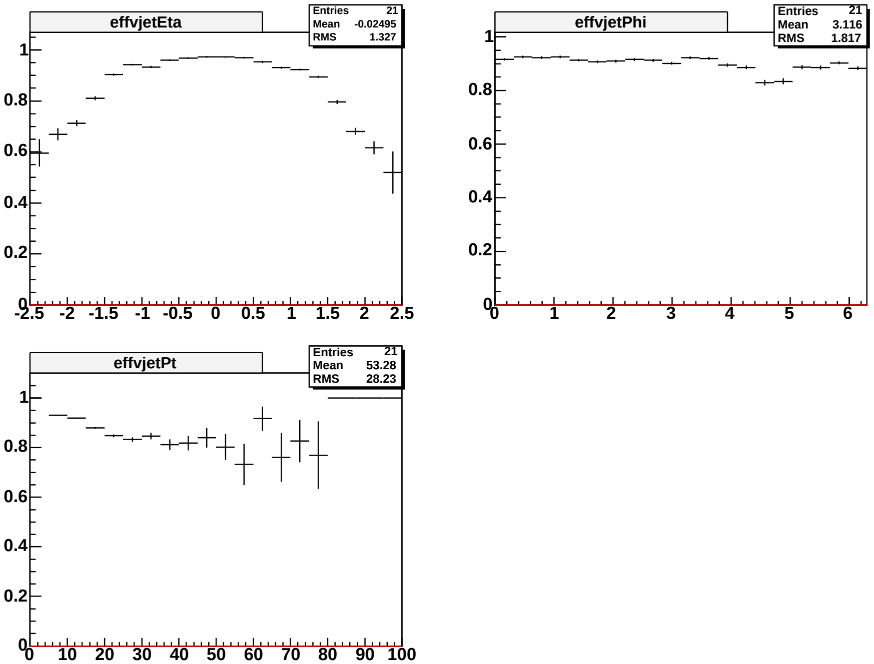
We don't track neutrally-charged particles.

effyvTick

We expect 36 ticks out of 132 + endeffects to have collisions and tracks and for the efficiency not to depend on the tick.

effyvTrkMult

Efficiency vs. Track Multiplicity.



Tracking (Efficiency-InJets)

Tracking Efficiency

Erich Varnes describes this page. "Efficiency is simply the fraction of muons that have a charged track pointing near them. I'm not sure how much Harry has modified what I've done (he's at least added the effVsTick plot)." His muon definition is essentially "Tight" (see descriptions of muon id) with some scintillator time cuts and pT > 2 GeV. Erich defines "near" as being within 0.15 in phi and theta.

Muons in jets.

effyvEta

Exchange 15-Apr-2003:
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Answer (EV): Low forward makes sense, in that we begin to lose layers of the CFT, making tracking more difficult. The peak at eta of 1.2 is a little harder to explain. Part of it may be the "random track overlap" effect I mentioned earlier. Since I defined matching using theta rather than eta, the odds of a random track pointing toward the muon increases as one moves forward.
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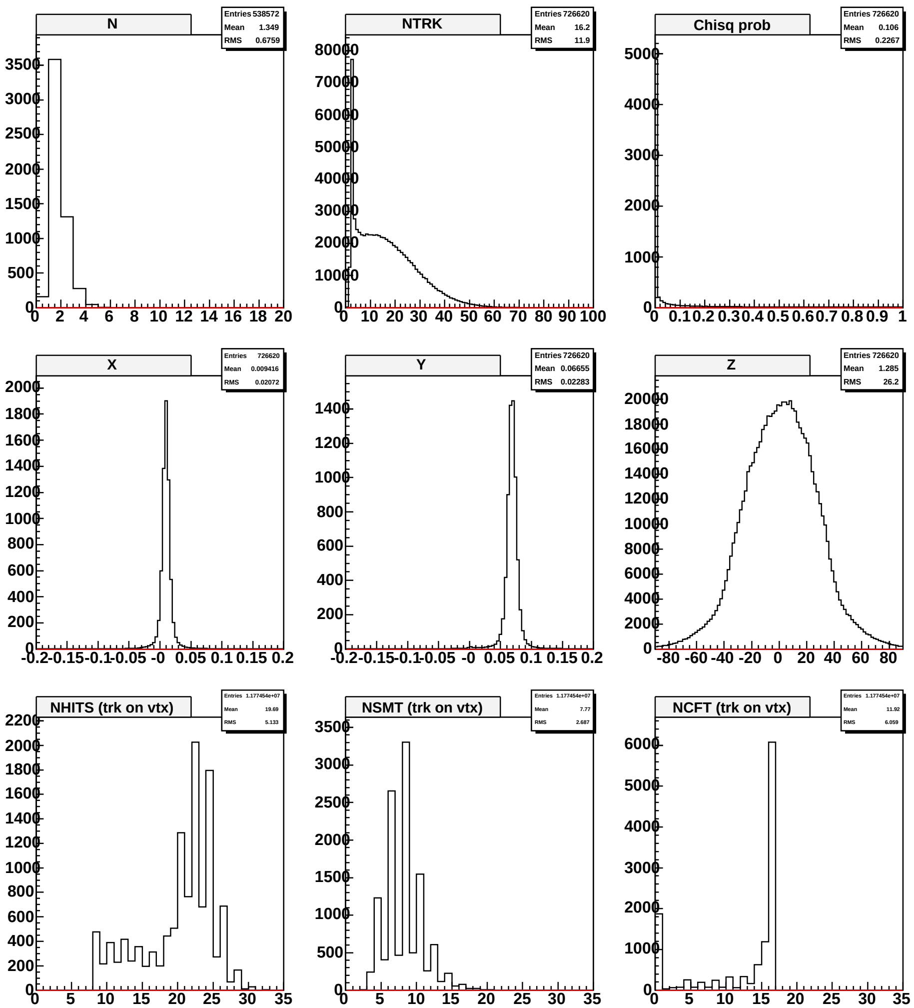
effyvTrkMult

Efficiency vs. Track Multiplicity.



Vertices (Primary - all candidates)

Vertices (Primary) Best

N

Number of vertices reconstructed per event. The number of entries is the number of events analyzed by RecoCert.

Exchange 15-Apr-2003:
Question (HTD): Why never more than one vertex?
Answer (MS): This is a "bug" in Harry's code!! He only histograms the "best" primary vertex, so no multiple vertices in an event..... Harry, you should not use get_PrimaryVertex, unless you really want to plot the best vertex only.

NTRK

Exchange 15-Apr-2003:
Question (HTD): What is this - the number of tracks coming out of the vertex?
Answer (MS): The number of tracks attached to the vertex. I'm a bit surprised by the spike at ~2. Did all Gordon's improvements to the primary vertex go into this p14 release? This spike reminds me of the split-vertices era.... It may be physics though....

Chisq prob

X

Vertex position in cm.

Y

Vertex position in cm.

Z

Vertex position in cm.

NHITs(trk on vtx)

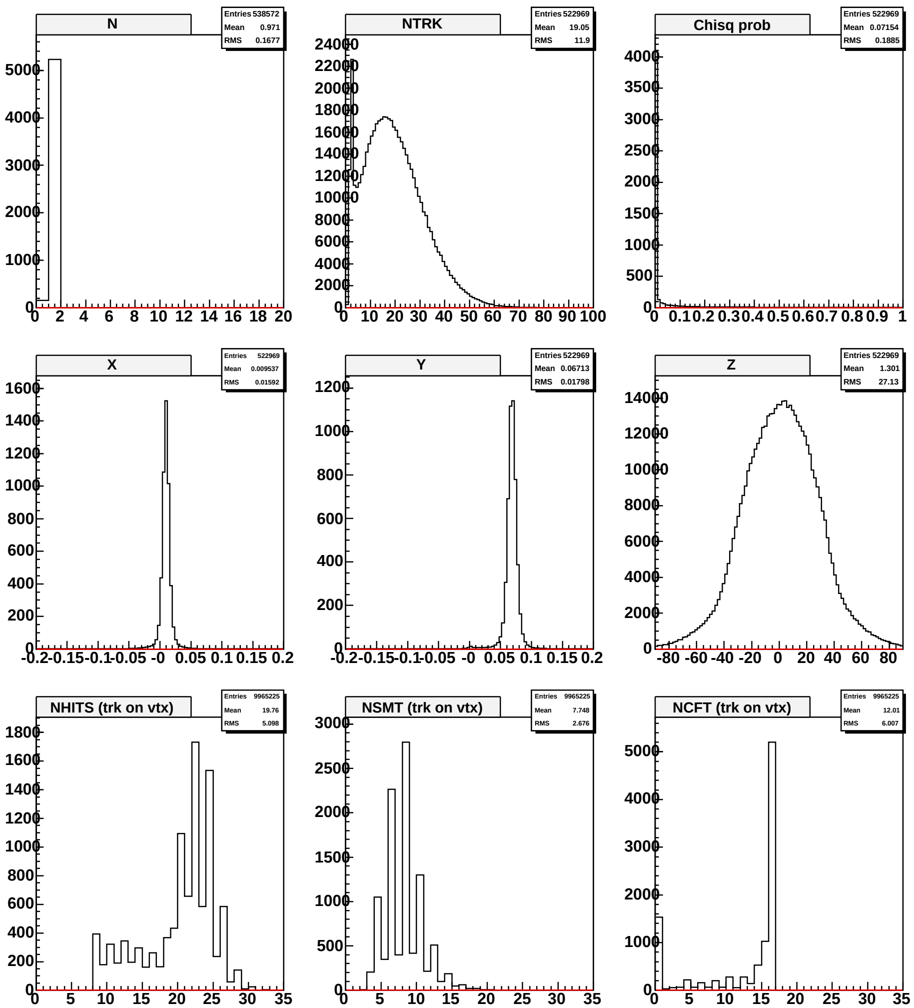
The sum of CFT and SMT hits on traks in the vertex.

NSMT (trk on vtx)

The number of SMT hits on tracks in the vertex.

NCFT (trk on vtx)

The number of CFT hits on tracks in the vertex.



Vertices (Primary - best)

Vertices (Primary) Best

N

Number of vertices reconstructed per event. The number of entries is the number of events analyzed by RecoCert.

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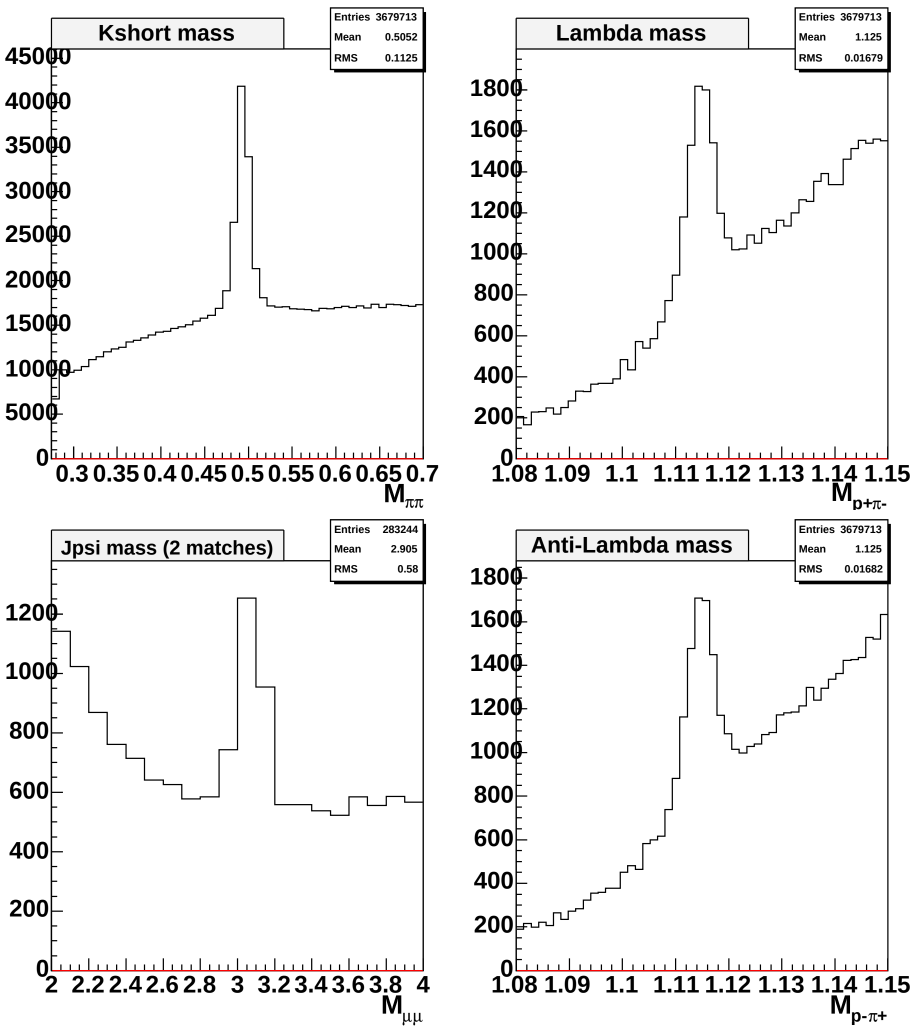


V0 (All)

V0 All

K-short Mass

K-short is a type of meson. pi+ & pi- decay mode.

Lambda Mass

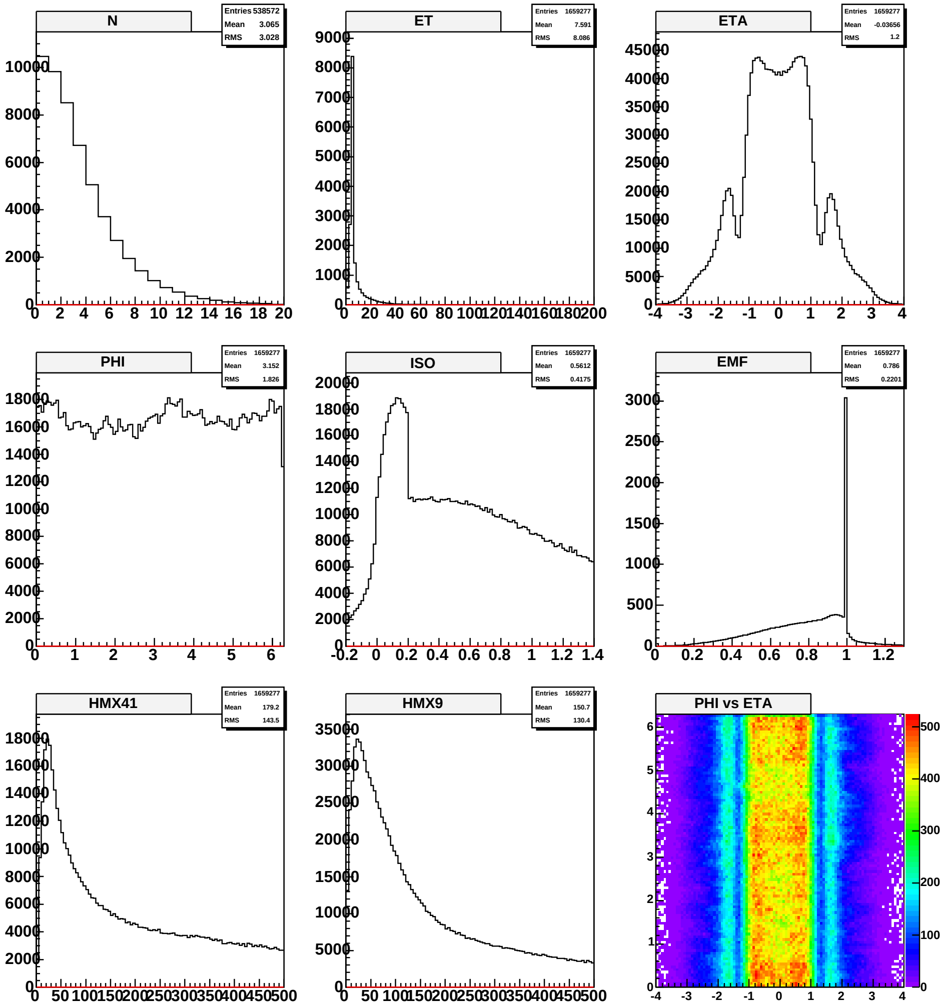
Lambda hyperon is u+d+s quarks in the simple quark model.
2/3 of time it goes proton & pi-. 1/3 time to n pi-0.

Jpsi Mass

Muons

Anti-lambda

Lambda-bar.



Electrons (SCONE All)

Electrons Scone (All)

Simple Cone Algorithm

N

Number of electrons per event.

Exchange 28-Apr-2003:
Question (HTD): How do we get so many electrons in an event? What is the object ID for these guys?
Answer (LD): The EM candidates stored in the EMparticleChunk satify very loose criteria. With such loose criteria, these plots are probably more indicative of the quality of CAL data rather than that of the electrons. Moreover, depending on the code to produce the plots, this may mix electrons from different algorithms (simple cone, CellNN, "road" method). That probably explains that there seem to be different populations in the isolation and EM fraction plots.

ET

Transverse energy (GeV).

Exchange 28-Apr-2003:
Question (HTD): How about a better x-scale? Maybe a log plot?
Answer ():

ETA

The eta (physics) of electrons.

Exchange 28-Apr-2003:
Question (HTD): What accounts for the peak on the +eta side at about 1.5? Or is it a deficit on the -eta side? I'd guess it's a deficit from the projection of the rate from the central calorimeter into the EC's.
Answer (LD): It's probably a deficit on the -eta side, but I don't know what could cause it. The explanation probably depends on the type of electron displayed (e.g. road electrons depend on tracking, CellNN might be more sensitive to noise that simple cone).

PHI

The phi of electrons.

Exchange 28-Apr-2003:
Question (HTD): What accounts for the variation?
Answer (LD): This is most probably a problem with the calorimeter (warm region ?)

ISO

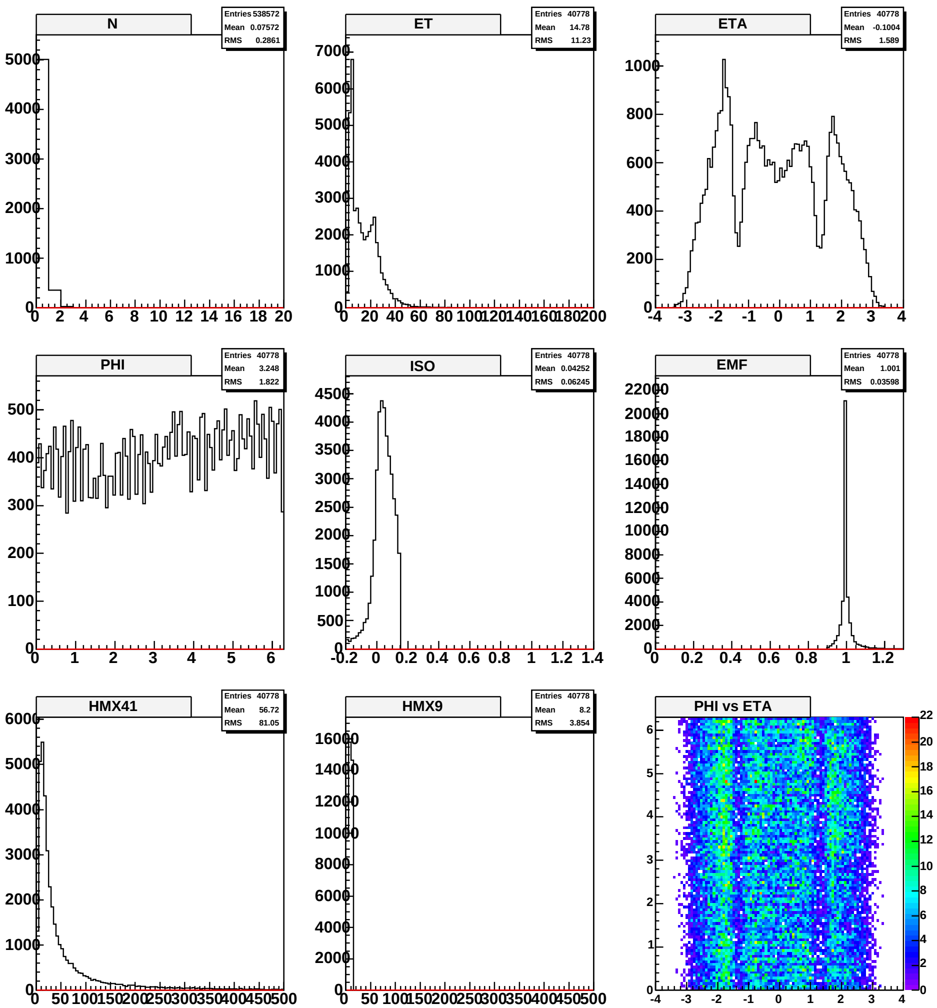
Electrons have isolation less than 0.15. Background is, I suppose flatish out to isolation of one or more.

Exchange 28-Apr-2003:
Question (HTD): What is this? What should we expect?
Answer (LD): I think that electrons from several algorithms are mixed and on simple cone has an isolation cut at 0.2 (see the plots for loos and tight electrons that are only simple cone electrons I believe). Negative isolation is probably due to negative energy cells in the neighborhood of the electron (electronic noise). For the same reason the EM fraction can be greater than 1.

EMF

Electromagnetic Fraction. Electrons will deposit most of their energy in the first few layer of the calorimeter. These layers have material appropriate for electromagnetic showers, so they are called the "electromagnetic calorimeter".

```
Exchange 28-Apr-2003:
Question (HTD): Are the electrons with low EMF background?
Answer      ():

HMX41
-----
H-matrix in 41 dimensions.  The H-matrix value for electrons peaks at around 20.
This doesn't seem tuned up to well. It doesn't look like we cut on this.

Exchange 28-Apr-2003:
Question (HTD): What goes into the 41D H-matrix?
Answer    (LD): Electrons are on the low HMX41 side. I think HMX41 contains
  the energy fractions in EM1,2,4 and cells in EM3, plus log(ET) and Zvertex.

HMX9
-----
H-matrix in 9 dimensions. It looks like we cut on that at 20.

Exchange 28-Apr-2003:
Question (HTD): What goes into the 9D H-matrix?
Answer    (LD): I thought that only the HMX8 was used (i.e. no preshower).
   electrons are on the low HMX9 side. The HMX9 contains the fractions in EM1
   to FH1 and the position in EM3.


PHI vs Eta
----------
A two-dimensional distribution. I suppose we are looking for hot spots or
dead regions.
```



Electrons (SCONE Tight)

Electrons Scone (Tight)

These plots are a repeat of Electrons(All) with a further "Tight" electron selection applied.

N

Number of electrons per event.

Exchange 29-Apr-2003:
Question (HTD): What distinguishes a "Tight" electron from a "Loose" electron.
Answer   ():

ET

Transverse energy (GeV).

ETA

The eta (physics) of electrons.

PHI

The phi of electrons.

ISO

Isolation.

EMF

Electromagnetic Fraction.

HMX41

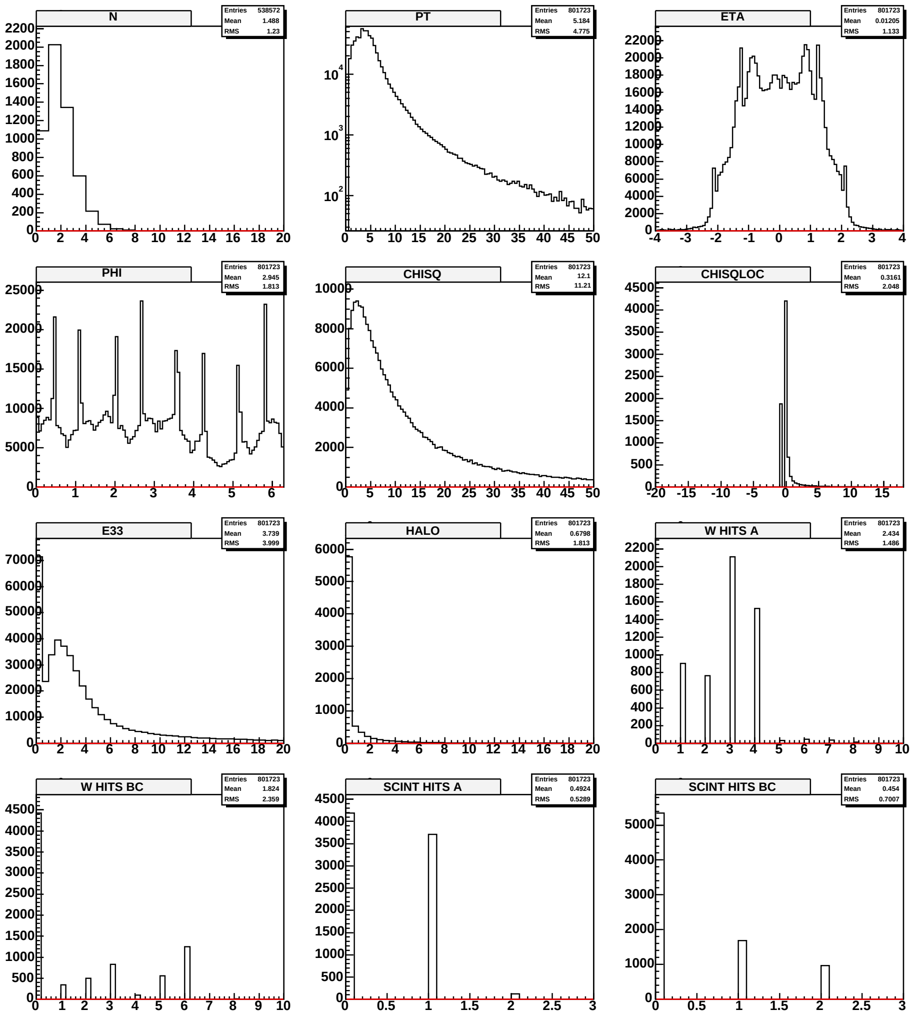
H-matrix in 41 dimensions.

HMX9

H-matrix in 9 dimensions.

PHI vs Eta

A two-dimensional distribution. I suppose we are looking for hot spots or dead regions.



Muons (All)

Muons(All)

N

The number of muons of all kinds. This includes A-stubs, BC-segments, three layer tracks, etc.

Exchange 29-Apr-2003:
Question (HTD): How many kinds of muons are there here? How many ways can one muon be counted?
Answer (SSR): There are 7 kind of muons (depending on nseg).
For a detailed description, please have a look at Table 1 of D0note 4091.

PT

The pT (GeV/c) of all muons. This comes from the tracker if the muon is matched. Otherwise it is the local muon pT. If the local fit was successful, then the global pt is the result of the combination of both measurements (dominated by the tracker measurement of course).

ETA

Eta of all muons. The boundary of the central muon system is between |eta| of 0.8 to 1.0 and is phi-dependent. The reason it is not at a fixed place is that the central muon system is rectangular sides of a box-shape. The boundary of the forward muon system is at |eta| of 1.6 to 2.0 for similar reasons.

Because physics (as opposed to detector) eta is plotted, the eta shown can be larger than the physics eta of the detector.

PHI

Phi of all muons. The periodic spikes are muons plotted at the centers of drift chamber (PDT and MDT) segments. There are fewer muons found in the plot between 4 < phi< 5, where the acceptance of octants 5 & 6 (bottom) is not as good as the rest of the detector.

CHISQ

The chi-sq of the matched central track.

Exchange 29-Apr-2003:
Question (HTD): What is fitted for this chi-sq?
Answer ():

CHISQLOC

The chi-sq of the fit for the muon local track (muon hits only).

Exchange 29-Apr-2003:
Question (HTD): Why does this have negative values? Why is the range apparently 0 to 4?
Answer (SSR): The default value is -1 (the fit has failed).

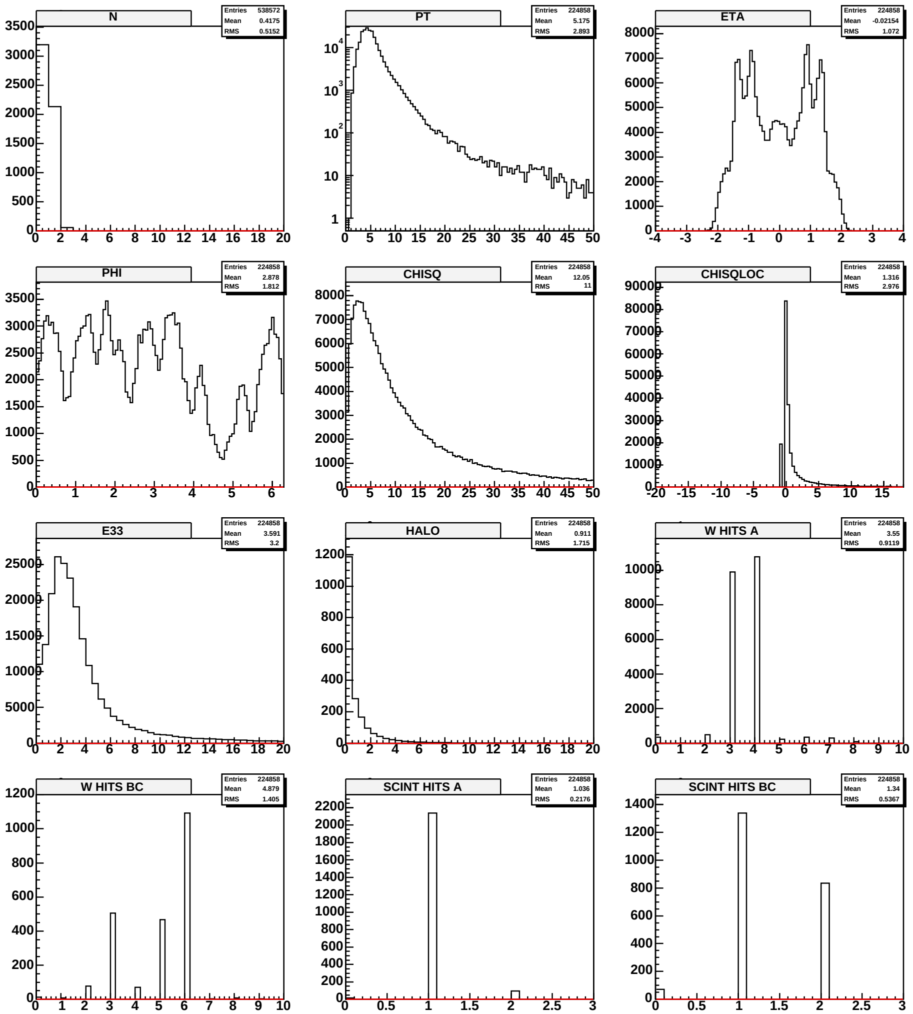
E33

The energy deposited in a 3x3 cone in the calorimeter (corresponding to delta eta x delta phi of 0.3 x 0.3) centered around the expected position the muon enters it. Muons deposit between 1 and 2.5+ GeV in the calorimeter depending on the angle it goes through.

Exchange 30-Apr-2003
Comment (FD): That's an undebugged (and not used) variable. This quantity is attached to central tracks (not filled for non-matched muon).

HALO

```
-----
The energy in a ring of inner radius 3x3 and outer radius 5x5 around the muon.
This helps determine muon isolation.

W HITS A
--------
The number of PDT and/or MDT hits in the A-layer. Most of
the A-layer has 4 decks. The central bottom has 3 decks.
Parts of octant 5 & 6 have no A-layer coverage at all.

Exchange 29-Apr-2003:
Question (HTD): Is this hits or decks?
Answer   (SSR): Hits.

W HITS BC
---------
The number of PDT and/or MDT hits in the B and C layers, summed.
These chambers have 3 decks. The peak at zero is A-stubs.

SCINT HITS A
------------
The number of A-layer scintillator hits.

SCINT HITS BC
-------------
The number of B + C layer scintillator hits. The central has,
except in some special places, only one b or C layer of
scintillator.  The forward muon system usually has both.
```



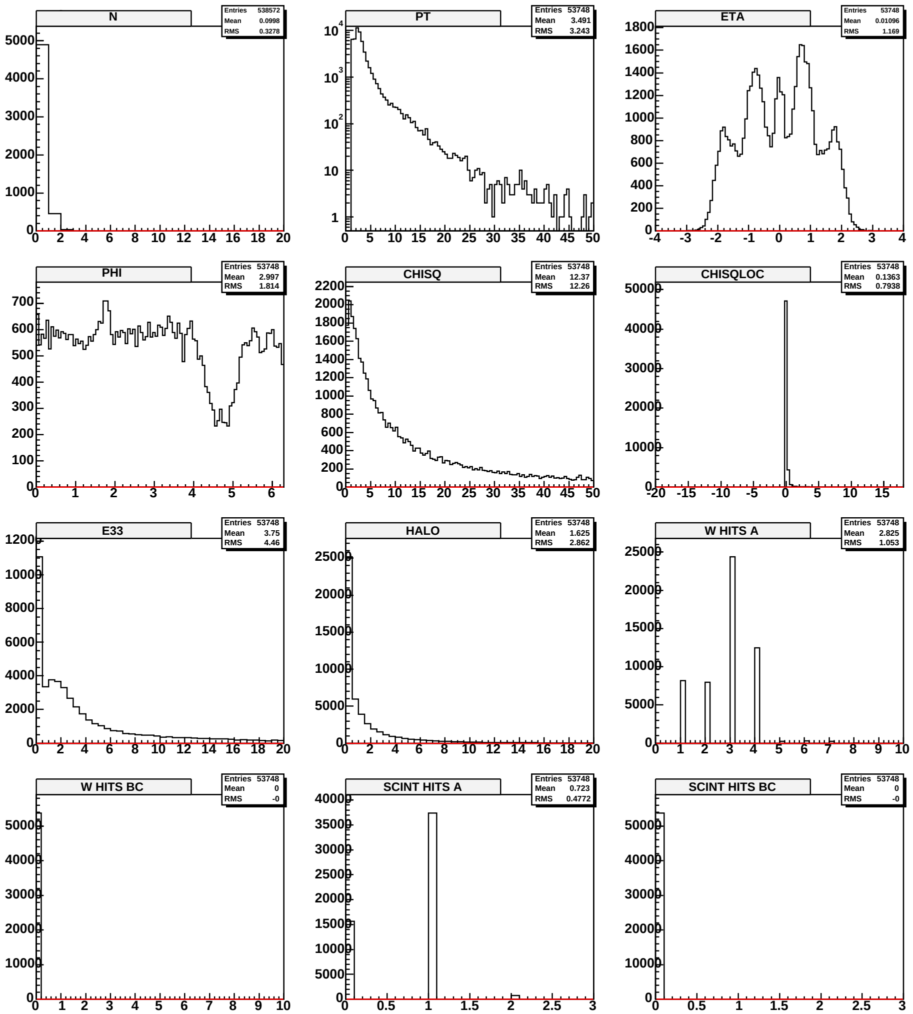
Muons (Matched)


```
Muons(Matched)

N
-----
The number of central-track matched muons of all kinds.

Exchange 29-Apr-2003:
Question (HTD): What kinds of tracks can be matched? What are the matching criteria?
Answer      ():

PT
-----
The pT (GeV/c) of all muons.

ETA
-----
Eta of all matched muons. The boundary of the central muon system is between |eta| of 0.8
to 1.0 and is phi-dependent. The reason it is not at a fixed place is that the
central muon system is rectangular sides of a box-shape. The boundary of the
forward muon system is at |eta| of 1.6 to 2.0 for similar reasons.

I think the forward has more muons than the central because the forward muon
system has more acceptance at low pT than the central. It takes about 4.5 GeV/c for
a muon to penetrate the toroid magnet.

This is the eta of the track.

PHI
-----
Phi of tracked muons. The distribution is the folding of the muon acceptance
with the tracker efficiency.

CHISQ
-----
The chi-sq of the track fit.

CHISQLOC
--------
The chi-sq of the fit for the muon local track (muon hits only).

E33
-----
The energy deposited in a 3x3 cone in the calorimeter (corresponding to
delta eta x delta phi of 0.3 x 0.3) centered around the expected position
the muon enters it.  Muons deposit between 1 and  2.5+ GeV in the
calorimeter depending on the angle it goes through.

HALO
-----
The energy in a ring of inner radius xxx and ounter radius yyy.
This helps determine muon isolation.

W HITS A
--------
The number of PDT and/or MDT hits in the A-layer. Most of
the A-layer has 4 decks. The central bottom has 3 decks.
Parts of octant 5 & 6 have no A-layer coverage at all.

Exchange 29-Apr-2003:
Question (HTD): Is this hits or decks?
Answer      (): Hits.

W HITS BC
---------
The number of PDT and/or MDT hits in the B and C layers, summed.
These chambers have 3 decks. The peak at zero is A-stubs.

SCINT HITS A
```

The number of A-layer scintillator hits.

SCINT HITS BC

The number of B + C layer scintillator hits. The central has, except in some special places, only one b or C layer of scintillator. The forward muon system usually has both.



Muons (Astub)

Muons(A-Stub)

These are the same plots as MUONS(ALL) except for A-stubs. A-stubs have no B or C-layer hits.

N

The number of Astub muons of all kinds.

PT

The pT (GeV/c) of A-stub muons. This comes from the tracker if the muon is matched. I don't know how the pT would be known, otherwise.

ETA

Eta of A-stub muons. The peaks near |eta|=1 are due to background scattered into the central region from the exit of the calorimeter.

PHI

Phi of A-stub muons. The deficit at phi~5 is because of there is 16% of phi in central region which supports the calorimeter. The are no A-layer detectors there.

CHISQ

The chi-sq of the track fit.

CHISQLOC

The chi-sq of the fit for the muon local track (muon hits only).

E33

The energy deposited in a 3x3 cone in the calorimeter (corresponding to delta eta x delta phi of 0.3 x 0.3) centered around the expected position the muon enters it. Muons deposit between 1 and 2.5+ GeV in the calorimeter depending on the angle it goes through.

HALO

The energy in a ring of inner radius xxx and ounter radius yyy. This helps determine muon isolation.

W HITS A

The number of PDT and/or MDT hits in the A-layer. Most of the A-layer has 4 decks. The central bottom has 3 decks. Parts of octant 5 & 6 have no A-layer coverage at all.

W HITS BC

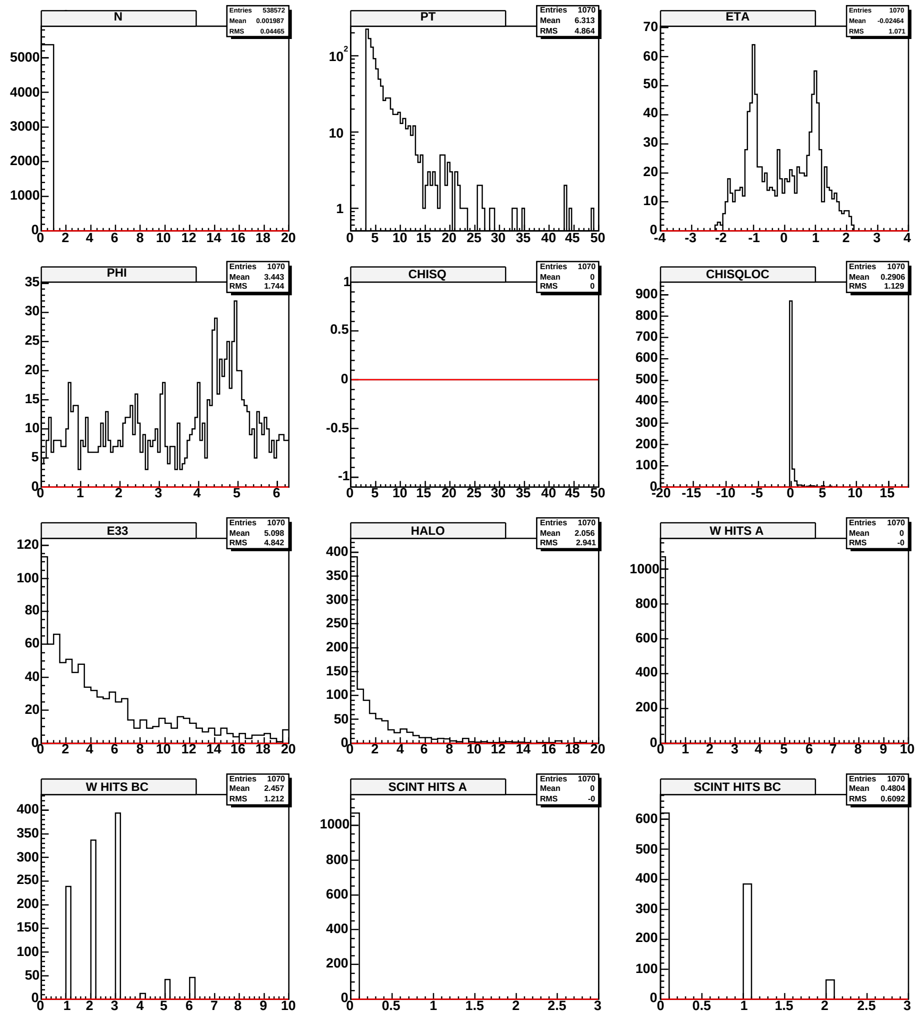
There are no BC hits on AStubs.

SCINT HITS A

The number of A-layer scintillator hits.

SCINT HITS BC

There are no BC hits on AStubs.



Muons (BCstub)


```
Muons(BC-Stub)

These are the same plots as MUONS(ALL) except for BC-stubs. BC-stubs have
no A-layer hits.

N
-----
The number of BC stub muons of all kinds.

PT
-----
The pT (GeV/c) of BC-stub muons.  This comes from the tracker if the muon is matched.
A pT can be calculated from the BC track and the hypothetical track from the
vertex to the projection of the BC track into the toroid.

ETA
-----
Eta of BC-stub muons.

PHI
-----
Phi of BC-stub muons. I expect them to be uniformly distributed in phi except
for octants 5 & 6, which should have more because of the A-layer hole in
the central.

CHISQ
-----
The chi-sq of the track fit. I don't know why this is always zero.

CHISQLOC
--------
The chi-sq of the fit for the muon local track (muon hits only).

E33
-----
The energy deposited in a 3x3 cone in the calorimeter (corresponding to
delta eta x delta phi of 0.3 x 0.3) centered around the expected position
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calorimeter depending on the angle it goes through.

HALO
-----
The energy in a ring of inner radius xxx and ounter radius yyy.
This helps determine muon isolation.

W HITS A
--------
BC stubs have no A-layer hits.


W HITS BC
---------
The number of BC wire hits on the segment.

SCINT HITS A
------------
BC stubs have no A-layer hits.

SCINT HITS BC
-------------
The number of BC scintillator hits on the segment.
```
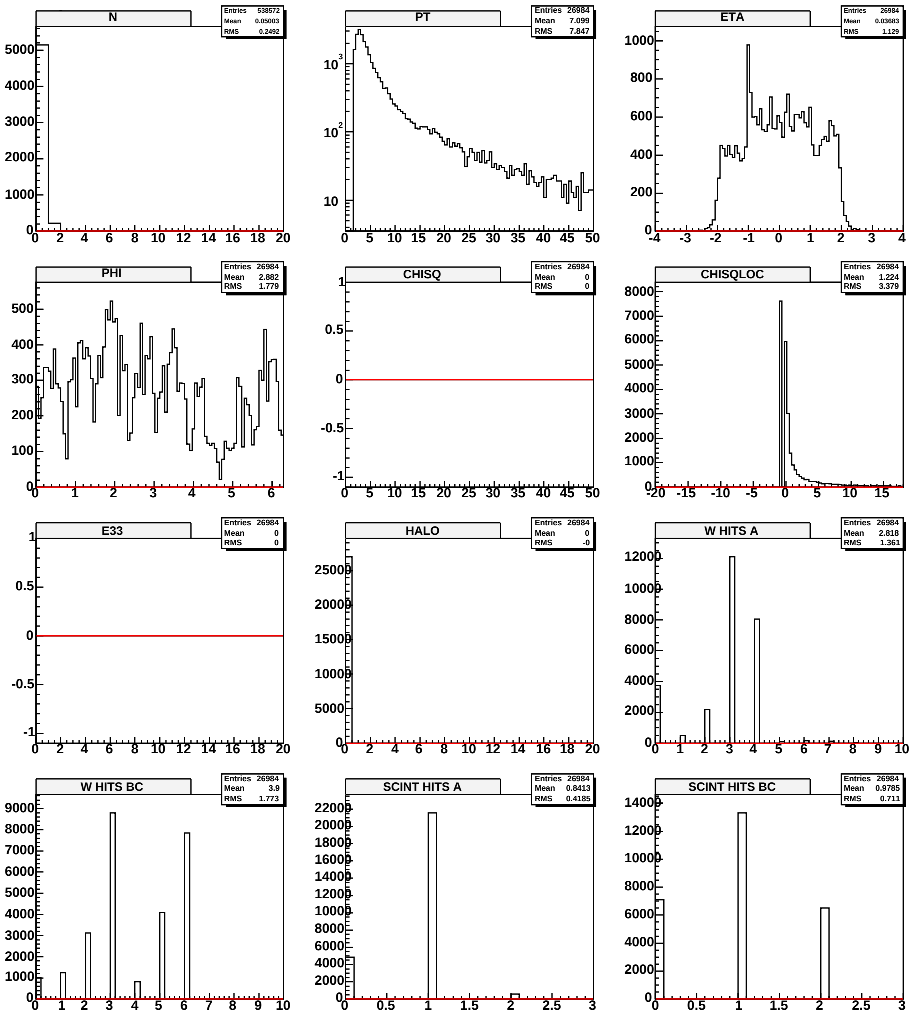



Muons (Unmatched)

Muons(UnMatched)

N

The number of central-track matched muons of all kinds.

Exchange 29-Apr-2003:
Question (HTD): What kinds of tracks can be matched? What are the matching criteria?
Answer   ():

PT

The pT (GeV/c) of all muons.

ETA

Eta of all matched muons. The boundary of the central muon system is between |eta| of 0.8 to 1.0 and is phi-dependent. The reason it is not at a fixed place is that the central muon system is rectangular sides of a box-shape. The boundary of the forward muon system is at |eta| of 1.6 to 2.0 for similar reasons.

I think the forward has more muons than the central because the forward muon system has more acceptance at low pT than the central. It takes about 4.5 GeV/c for a muon to penetrate the toroid magnet.

This is the eta of the track.

PHI

Phi of tracked muons. The distribution is the folding of the muon acceptance with the tracker efficiency.

CHISQ

The chi-sq of the track fit.

CHISQLOC

The chi-sq of the fit for the muon local track (muon hits only).

E33

The energy deposited in a 3x3 cone in the calorimeter (corresponding to delta eta x delta phi of 0.3 x 0.3) centered around the expected position the muon enters it. Muons deposit between 1 and 2.5+ GeV in the calorimeter depending on the angle it goes through.

HALO

The energy in a ring of inner radius xxx and ounter radius yyy.
This helps determine muon isolation.

W HITS A

The number of PDT and/or MDT hits in the A-layer. Most of the A-layer has 4 decks. The central bottom has 3 decks.
Parts of octant 5 & 6 have no A-layer coverage at all.

Exchange 29-Apr-2003:
Question (HTD): Is this hits or decks?
Answer   (): Hits.

W HITS BC

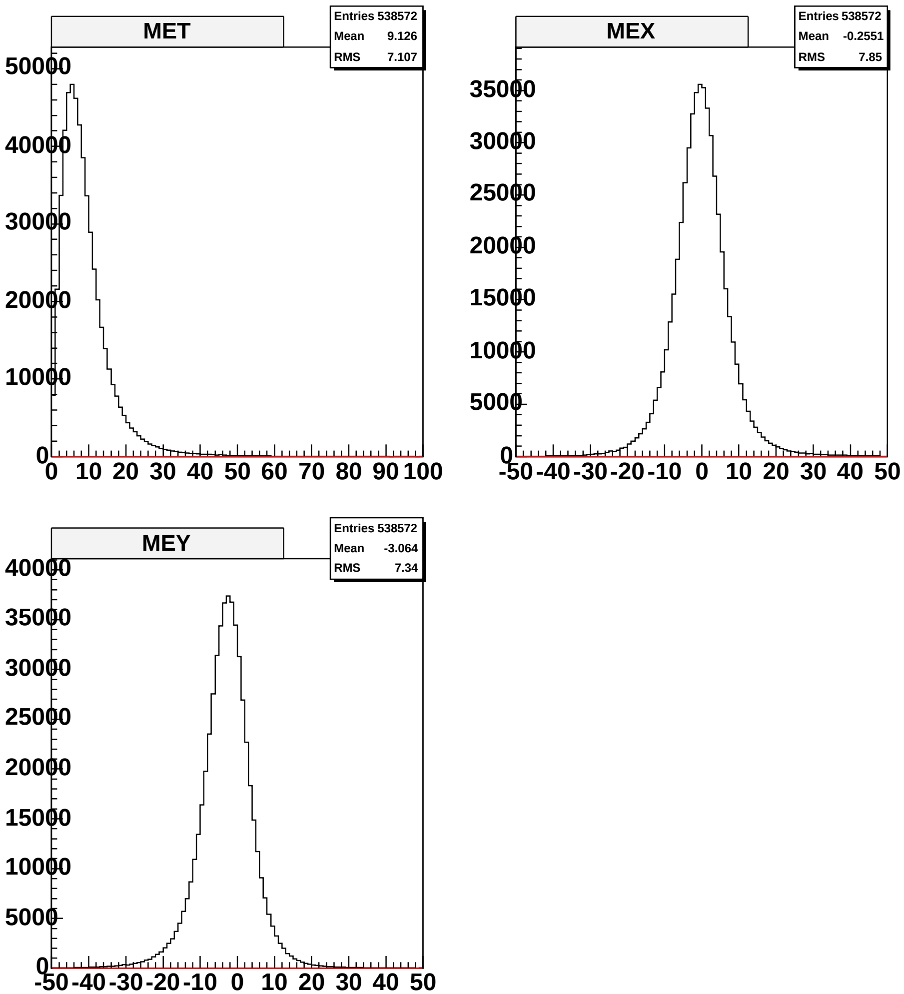
The number of PDT and/or MDT hits in the B and C layers, summed.
These chambers have 3 decks. The peak at zero is A-stubs.

SCINT HITS A

The number of A-layer scintillator hits.

SCINT HITS BC

The number of B + C layer scintillator hits. The central has, except in some special places, only one b or C layer of scintillator. The forward muon system usually has both.



Met (No cuts)

MET (No Cuts)

These must be among the most familiar distributions at DZero. We expect components of MET to be

MET

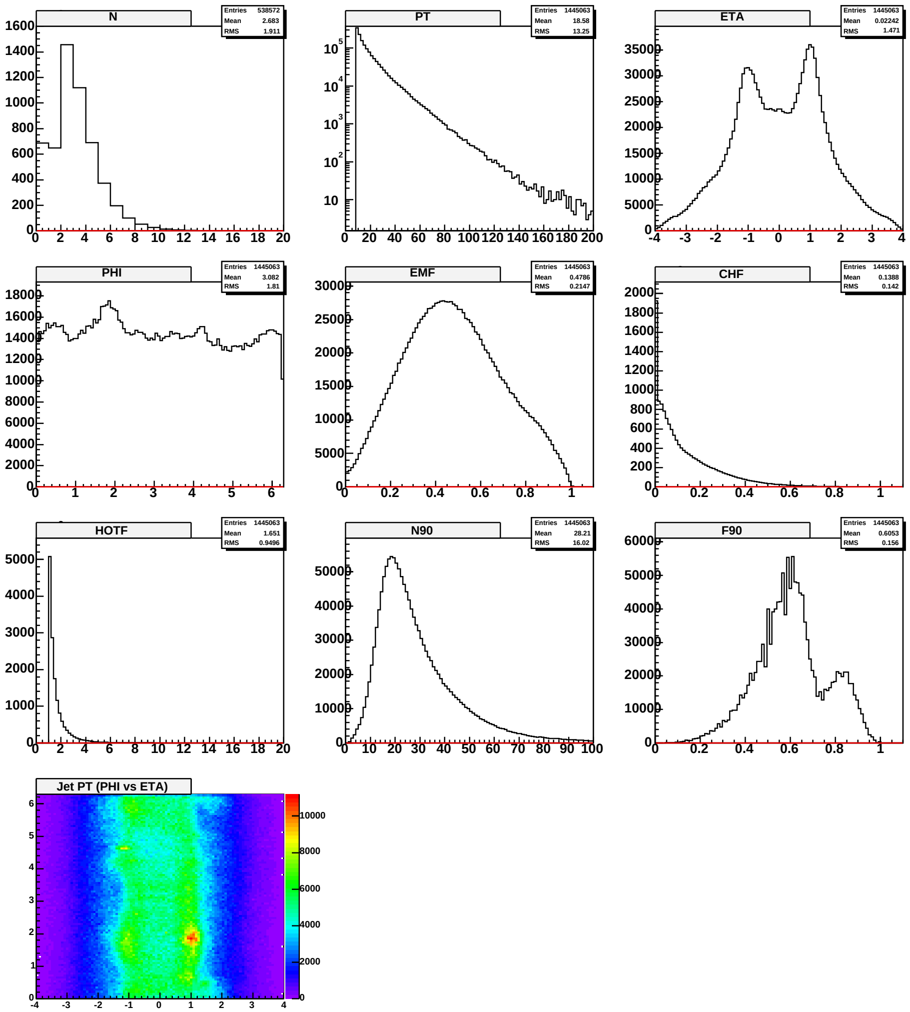
The square-root of the sum of the squares of the MET components. In the run I looked at first the mean was 9.1 GeV. The number of events in the 20 GeV bin was approximately 1/10th that in the peak.

MEY

Missing energy Y-component. We expect this to be small and symmetric around zero. The RMS is under 8 GeV.

MRX

Missing energy X-component. We expect this to be small and symmetric around zero. The x and y resolutions should be the same as each other.



Jets (Cone R 0.7 (no cuts))

Jets (Cone R=0.7) No Cuts

Jets reconstructed using the cone algorithm.

N

The number of jets in the event. I see a two-peaked distribution with 2 jets most-likely and 0 jets next-most-likely. That is understandable given that QCD events tend to have at least two or more jets, balancing in Et. Other events have either two or more jets that fall below threshold (typical of MinBias) or no jets at all above threshold.

There are lots of events with 3 or more jets and even a few with 10.

Exchange 18-Apr-2003
Question (GB): The high multiplicity is due to fake jets, due to noise.
   Are quality criteria applied (see jetmet web page/certification)?
Answer   (HM): No quality cuts yet. Perhaps it's better to monitor "all"
   jets.
Answer   (MW): The cut Et>8GeV for these plots is extremely low. At such
               low Et we expect large numbers of multijet events - even
               with such high multiplicities. (of course, there is also
               some background here - but not *only* background)

Et

The Et of jets. We don't save jets reconstructed with Et less than 8 GeV.

Eta

Jet eta. There must be a fairly heavy trigger bias as jets are produced approximately flat in eta at a given Et.

Exchange 18-Apr-2003
Question (HTD): Why does it fall at higher eta? What are the horns at |eta|=1.1?
Answer   (GB): It's trigger coverage. Cases where the jet deposits lots of
                energy on coarse hadronic (CH). The CH tends to be noisy.
Answer   (MW): Jets are not produced flat in eta (also not for a given Et).
                NLO predicts that for:
                   Et> 50GeV the eta spectrum dies out at eta>2.7
                   Et>100GeV   - " -   eta>2.0
                   Et>400GeV   - " -   eta>1.0
                I can't give a good explanation for the horns. But it looks
                as if jets at |eta|=1.3 are reconstructed at smaller values
                so their |eta| is shifted to approx 1.0

Phi

Jet phi.

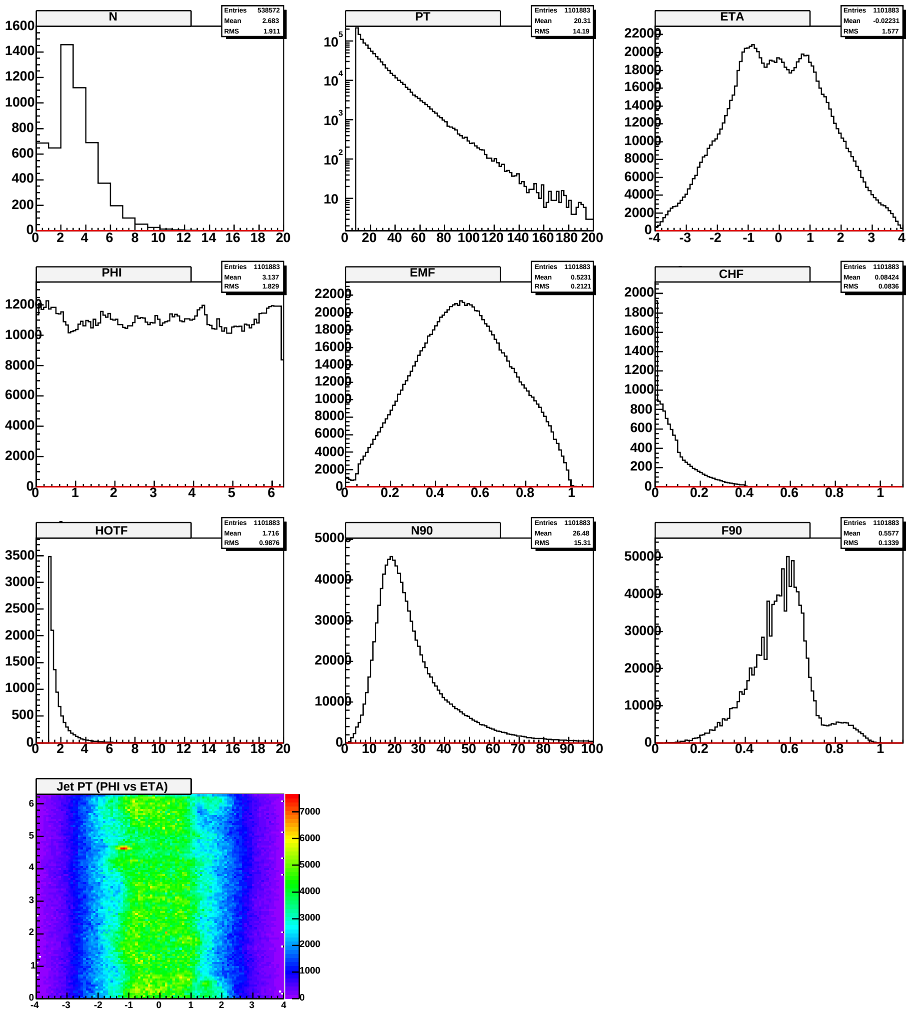
Exchange 18-Apr-2003
Question (HTD): What's with the large bump at phi=1.6 and the smaller one at
   phi=3.2?
Answer   (GB): Calorimeter problems (a warm zone, under investigation).

EMF

The electromagnetic fraction of jets, including electrons.

Exchange 02-May-2003
Question (HTD): Does this include electrons?
Answer   (MW): I don't know what this plot includes....
                But in principle an isolated electron will be classified
                as a jet (until the jet selection criteria remove this
                background).
                Standard jet ID selection criterion: 0.05<EMF<0.95

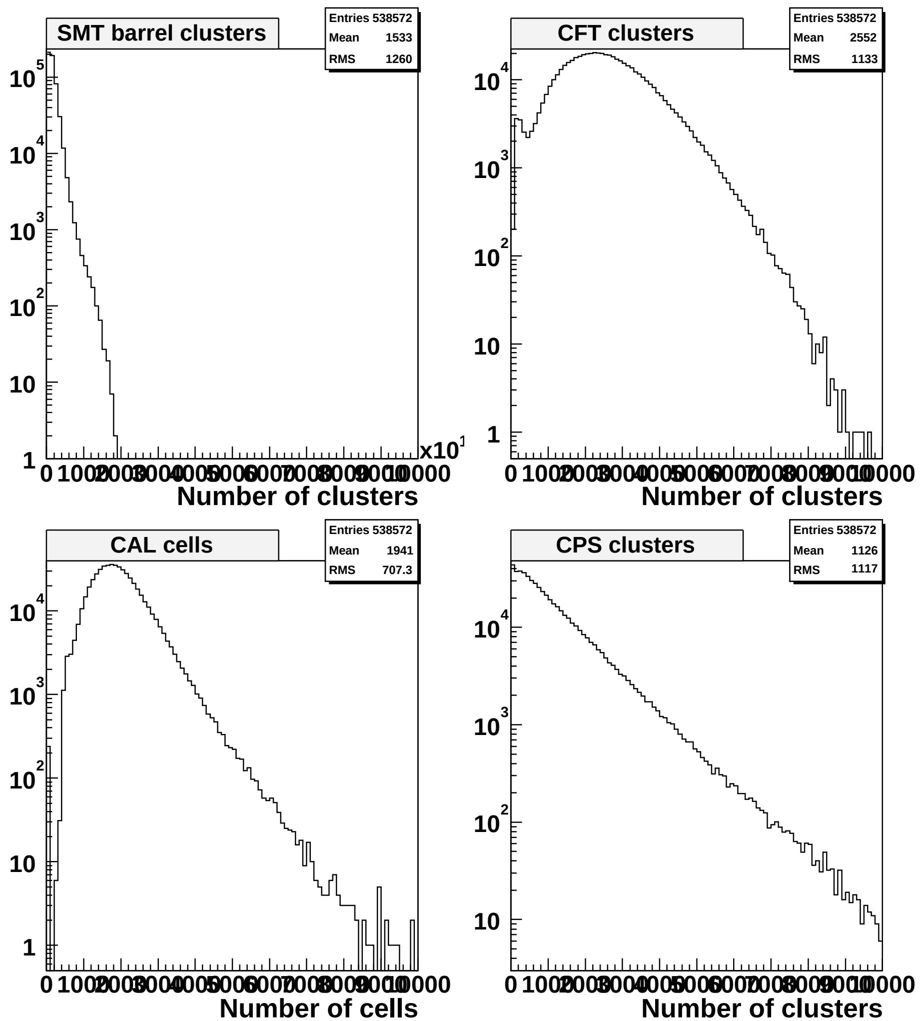
```
CHF
-----
Coarse hadronic fraction. This is a selection criteria for jets.

Exchange 02-May-2003
Question (HTD): What is standard jet ID selection criteria?
Answer    (MW): CH < 0.4

HOTF
-----

Exchange 02-May-2003
Question (HTD): What is this?
Answer    (MW): The ratio of the transverse energy of the leading cell
                in the jet and the transv. energy of the second leading
                cell in the jet.
                Standard jet ID selection criterion:  HotF<10



N90
-----

Exchange 02-May-2003
Question (HTD): What is this?
Answer    (MW): The number of towers which contain at least 90% of the jet
                energy. Standard jet ID selection criterion:  N90>1.



F90
-----

Exchange 02-May-2003
Question (HTD): What is this?
Answer    (MW): The ratio of N90 and the total number of towers in the jet.
                The standard selection does not directly cut on this
                variable, but only on the combined variable f90ch, defined
                as: f90ch = f90 + 0.5 CHF.
                The cut is:   CHF<0.1  or  f90ch<0.8.



Jet Et (PHI vs ETA)
-------------------

Exchange 18-Apr-2003
Question (HTD): I'm not sure I understand this plot. What's it mean?
Answer      ():
```



Jets (Cone R 0.7 (standard cuts))

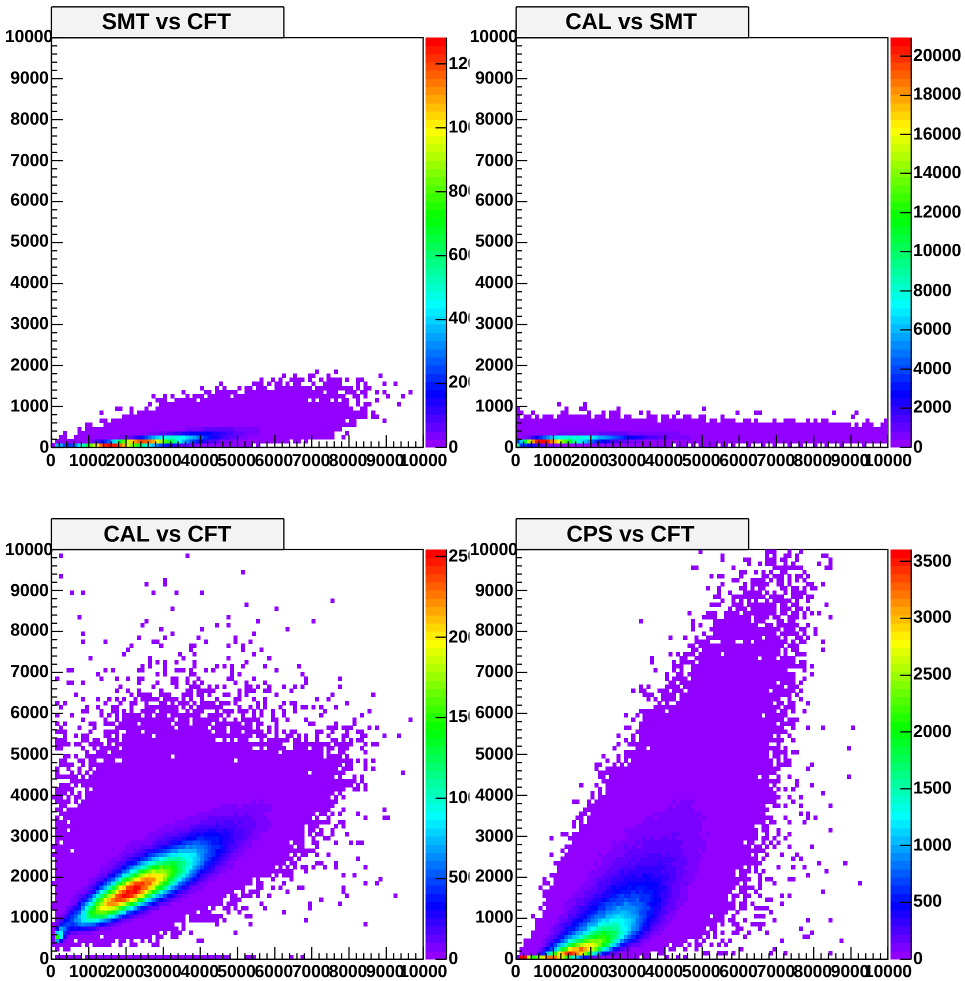

```
Jets (Cone R=0.7) Standard Cuts

Jets reconstructed using the cone algorithm with standard jet ID applied.
They are a repeated set similar to Jets ALL (Cone=0.7).

N
-----
The number of jets in the event.  I see a two-peaked distribution with
2 jets most-likely and 0 jets next-most-likely.  That is understandable
given that QCD events tend to have at least two or more jets, balancing
in Et.  Other events have either two or more jets that fall below
threshold (typical of MinBias) or no jets at all above threshold.

There are lots of events with 3 or more jets and even a few with 8.

Et
-----
The Et of jets.  We don't save jets reconstructed with Et less than 8 GeV.

Eta
-----
Jet eta.  There must be a fairly heavy trigger bias as jets are
produced approximately flat in eta at a given Et.


Phi
-----
Jet phi.

EMF
-----
The electromagnetic fraction of jets, including electrons.

Exchange 02-May-2003
Question (HTD): Does this include electrons?
Answer      ():

CHF
-----
Coarse hadronic fraction. This is a selection criteria for jets.

Exchange 02-May-2003
Question (HTD): What is standard jet ID selection criteria?
Answer      ():

HOTF
-----

Exchange 02-May-2003
Question (HTD): What is this?
Answer      ():

N90
-----

Exchange 02-May-2003
Question (HTD): What is this?
Answer      ():

F90
-----

Exchange 02-May-2003
Question (HTD): What is this?
Answer      ():


Jet Et (PHI vs ETA)
```

```
-------------------

Exchange 18-Apr-2003
Question (HTD): I'm not sure I understand this plot. What's it mean?
Answer      ():
```



Detector Occupancy (Detector)


```
Detector Occupancy

Number of SMT Barrel Clusters
-------------------
Per event.

Number of CFT Clusters
----------------------

Number of Cal Cells
-------------------

Number of CPS Clusters
----------------------
```



Detector Occupancy (Detector)

Detector Occupancy @ D plots

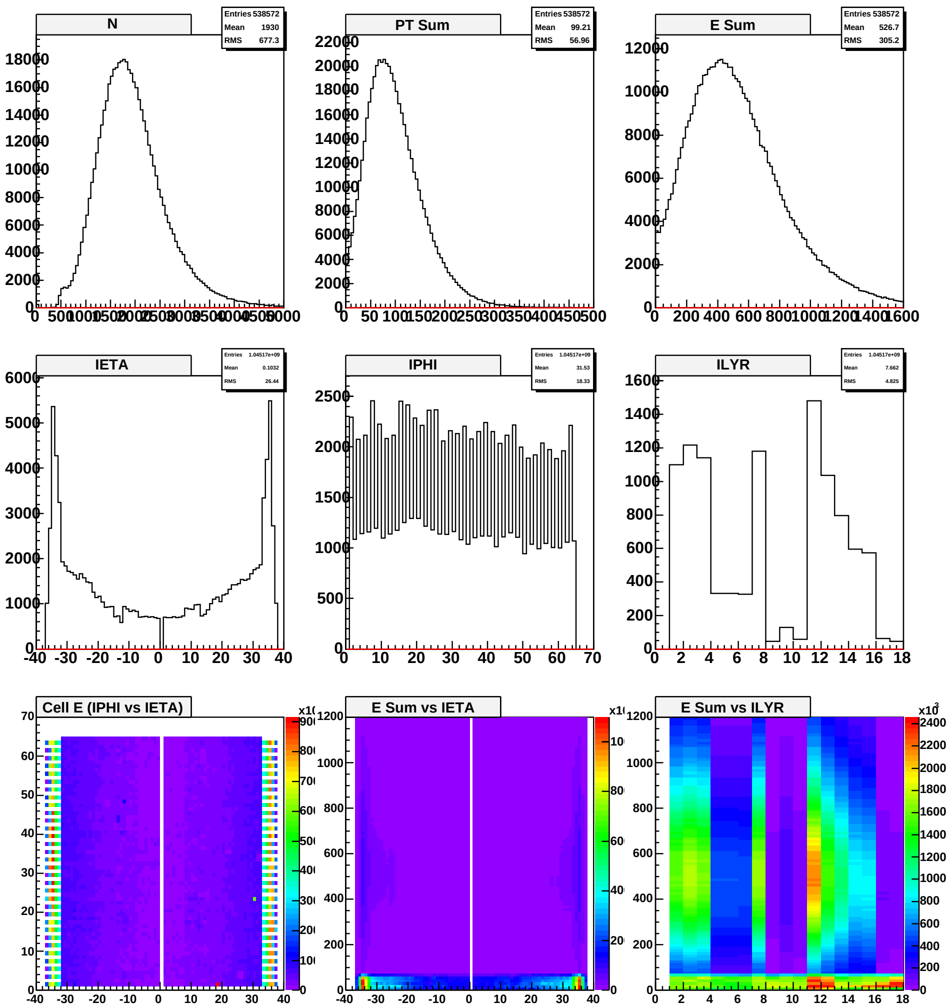
Number of SMT Barrel Clusters vs Number of CFT Plots

Per event.

Cal vs SMT

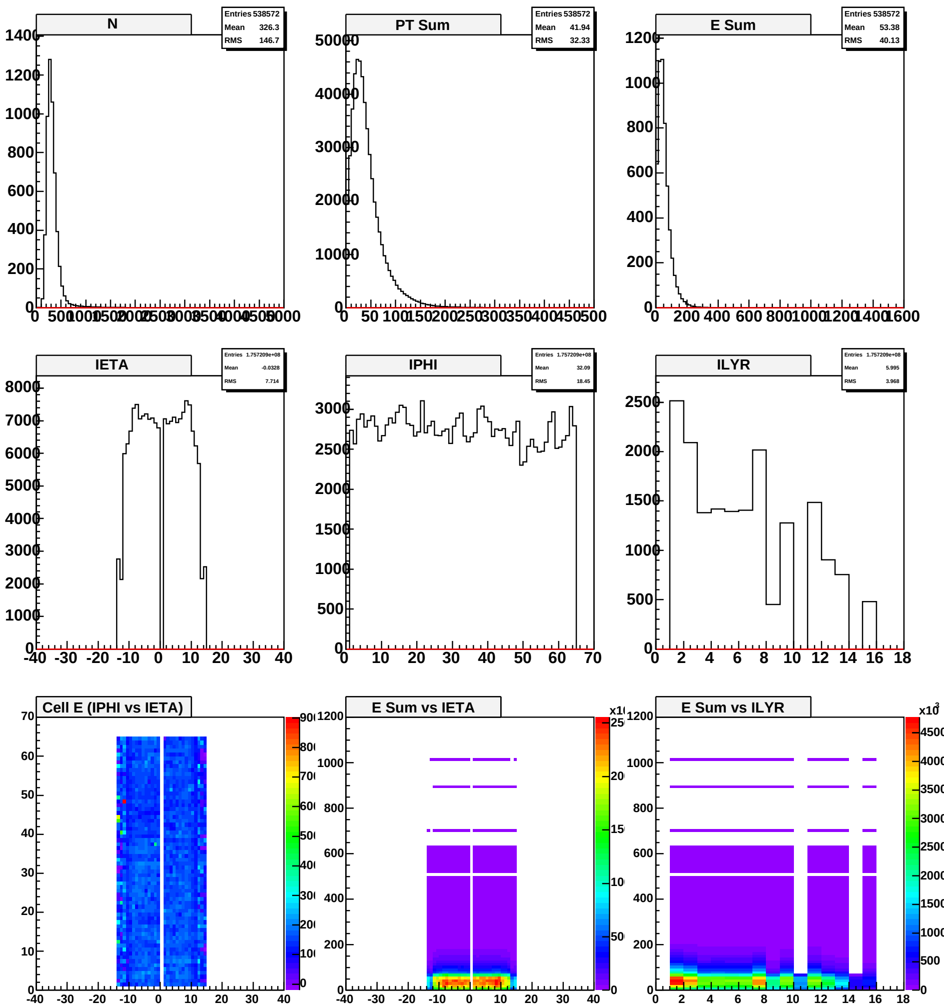
Calvs CFT

CPS vs CFT



Calorimeter (All cells)


```
Calorimeter (All Cells)

N
-----
The number of cells above a threshold.

Exchange 15-Apr-2003:
Question (HTD): What is the threshold?
Comment   (LD): ~1800/55k = 3% occupancy and that seems low.
Answer    (HM): Reco's default threshold.  There is some calibration. We don't
   use the database.  It's after hot-cell-killing (NADA).

pT Sum
------
Scaler sum of pT from all cells.

E Sum
-----
Scaler sum of E of all cells.

IETA
-----
Eta of all cells in 1/10th eta units.

Exchange 15-Apr-2003:
Question (HTD): Why the horns at |eta| ~ 3.5?
Answer    (LD): There is alot of physics activity (low Et jets)
   at large eta, close to the beampipe.

IPHI
-----
Phi of all cells in pi/10 units.

Exchange 15-Apr-2003:
Question (HTD): Why is every other bin 40% taller?
Answer    (LD):  I could be the binning (there are exact 64 iphi, from 1 to 64),
   but the effect is most probably due to the inclusion of the very forward
   region: for ieta>32, the cells are ~0.2 in phi so only the even iphi cell exist.

ILYR
-----
ILayer. The EM layers are: 1 - EM1; 2 - EM2; 3 to 6 - EM3; 7 - EM4.
The transition layers are: 8 CCMG (massless gap); 9 - ICD; 10 - ECMG.
The fine hadronic layers are: 11 - FH1; 12 - FH2; 13 - FH3; 14 - FH4 (EC only).
The coarse hadronic layers are: 15 - CH1; 16 - CH2 (exists only for
9 .le. |ieta| .le. 15); 17 - CH3 (exists only for 9 .le. |ieta| .le. 15).

Cell E(IPHI vs IETA)
--------------------
A 2D-histo of cells over threshold. We are looking for hot cells in this plot.

ESUM vs IETA
------------
The energy summed over ieta ring per event.

ESUM vs ILYR
------------
The energy summed over ilayer detector per event.
```



Calorimeter (All CC cells)

Calorimeter (CC Cells)

This is a repeat of Calorimeter (All) concentrating on the CC.

N

The number of cells above a threshold.

pT Sum

Scaler sum of pT from all cells.

E Sum

Scaler sum of E of all cells.

IETA

Eta of all cells in 1/10th eta units.

IPHI

Phi of all cells in pi/10 units.

ILYR

ILayer. The EM layers are: 1 - EM1; 2 - EM2; 3 to 6 - EM3; 7 - EM4.
The transition layers are: 8 CCMG (massless gap); 9 - ICD; 10 - ECMG.
The fine hadronic layers are: 11 - FH1; 12 - FH2; 13 - FH3; 14 - FH4 (EC only).
The coarse hadronic layers are: 15 - CH1; 16 - CH2 (exists only for
9 .le. |ieta| .le. 15); 17 - CH3 (exists only for 9 .le. |ieta| .le. 15).

Cell E(IPHI vs IETA)

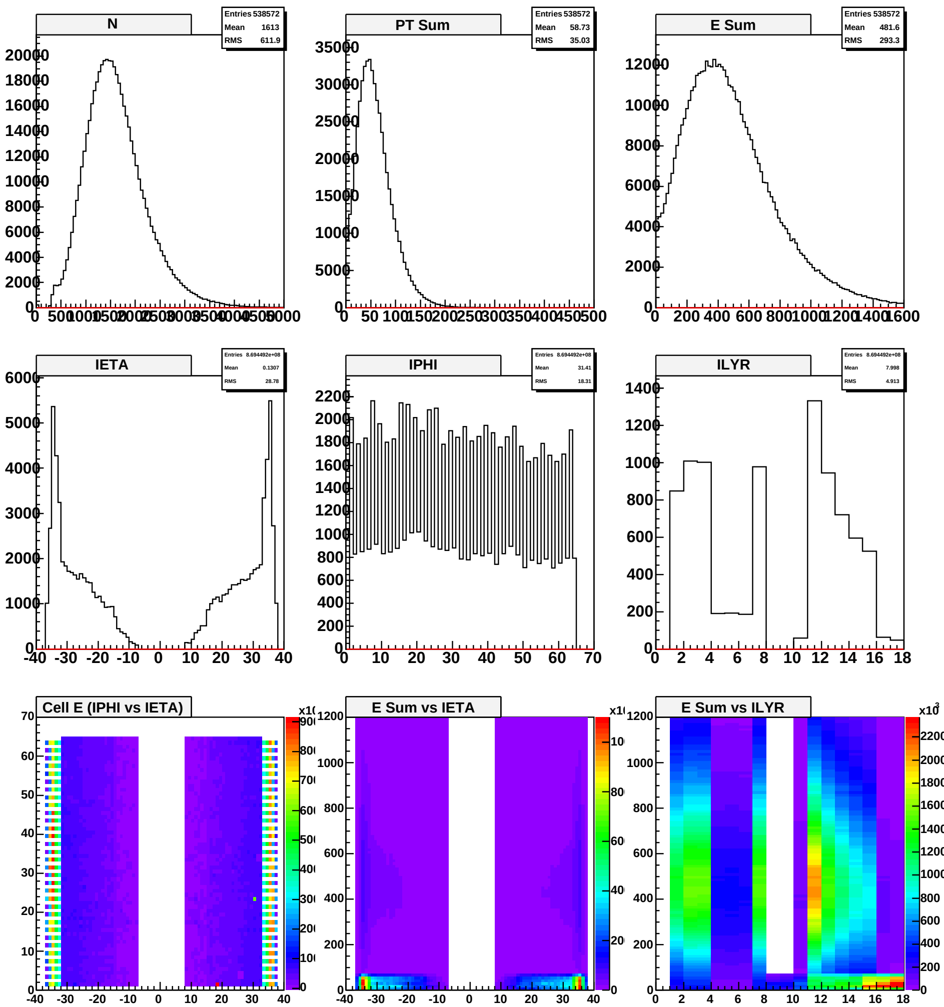
A 2D-histo of cells over threshold. We are looking for hot cells in this plot.

ESUM vs IETA

The energy summed over ieta ring per event.

ESUM vs ILYR

The energy summed over ilayer detector per event.



Calorimeter (All EC cells)

Calorimeter (EC Cells)

This is a repeat of Calorimeter (All) concentrating on the EC.

N

The number of cells above a threshold.

pT Sum

Scaler sum of pT from all cells.

E Sum

Scaler sum of E of all cells.

IETA

Eta of all cells in 1/10th eta units.

IPHI

Phi of all cells in pi/10 units.

ILYR

ILayer. The EM layers are: 1 - EM1; 2 - EM2; 3 to 6 - EM3; 7 - EM4.
The transition layers are: 8 CCMG (massless gap); 9 - ICD; 10 - ECMG.
The fine hadronic layers are: 11 - FH1; 12 - FH2; 13 - FH3; 14 - FH4 (EC only).
The coarse hadronic layers are: 15 - CH1; 16 - CH2 (exists only for
9 .le. |ieta| .le. 15); 17 - CH3 (exists only for 9 .le. |ieta| .le. 15).

Cell E(IPHI vs IETA)

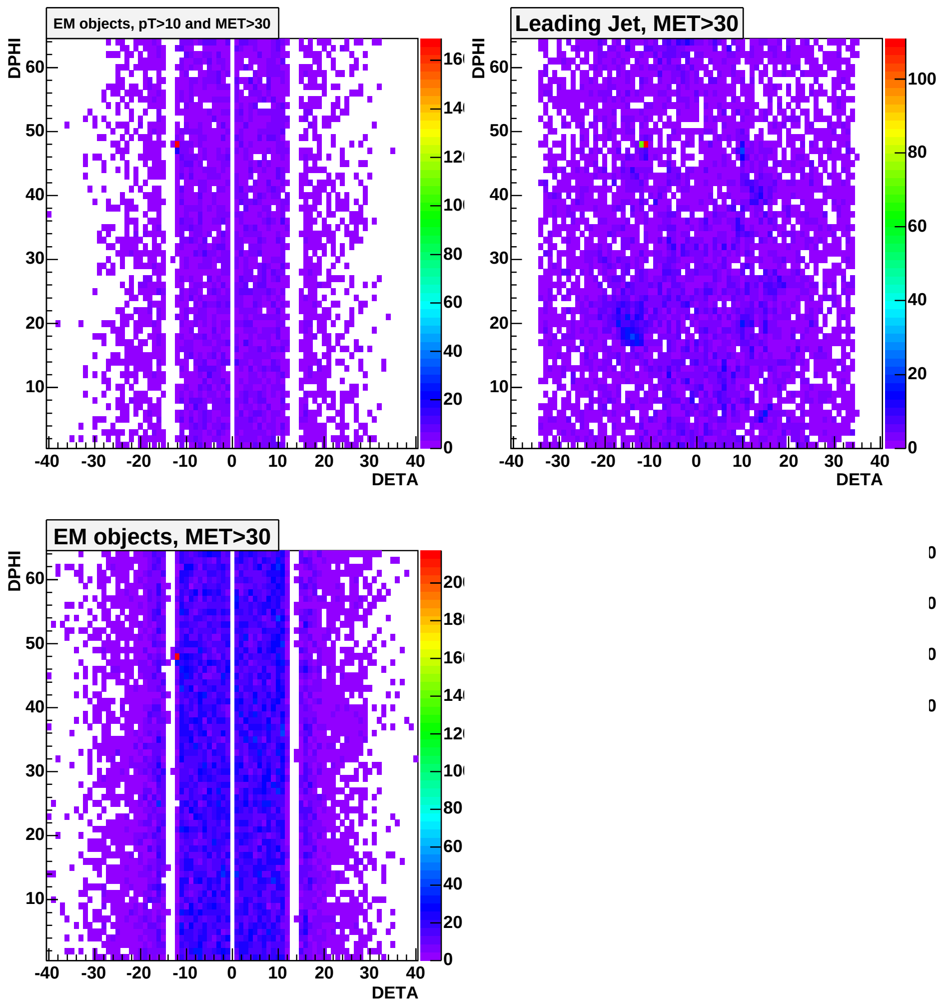
A 2D-histo of cells over threshold. We are looking for hot cells in this plot.

ESUM vs IETA

The energy summed over ieta ring per event.

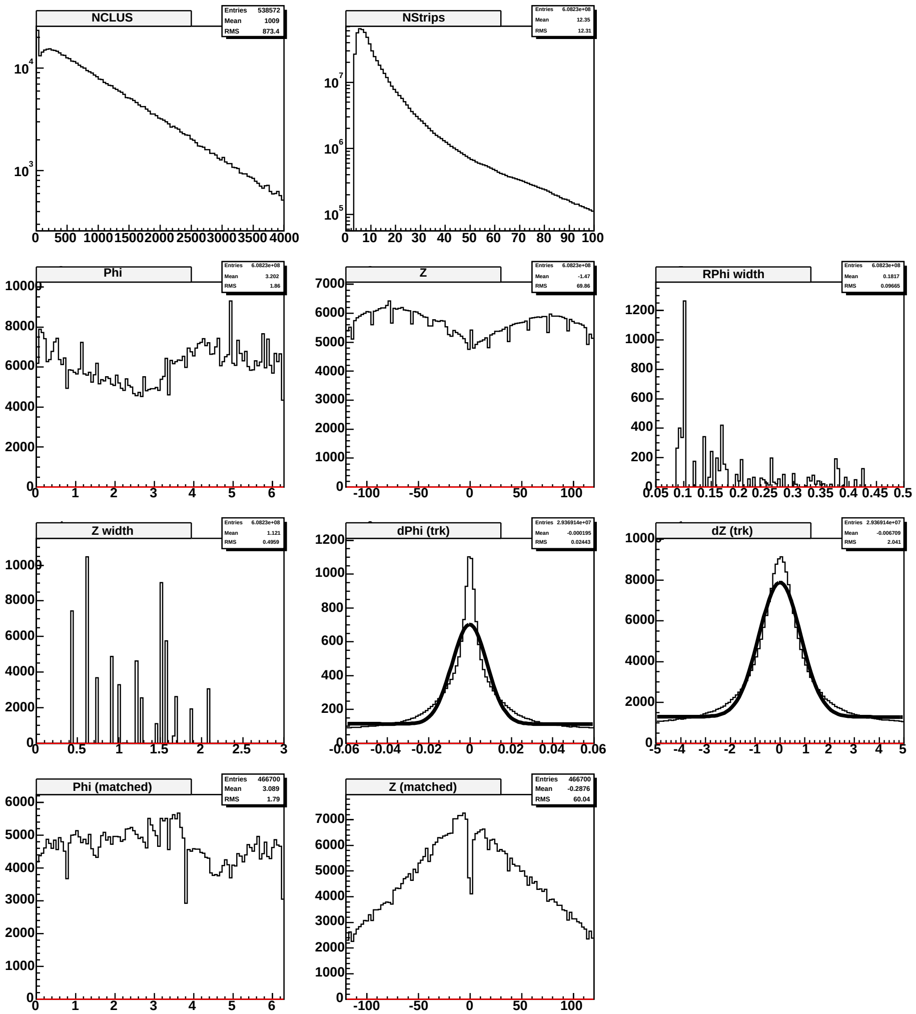
ESUM vs ILYR

The energy summed over ilayer detector per event.



Calorimeter (All cells)


```
Calorimeter (All Cells) Hi MET


DETA for EM Objects pT> 10 GeV and MET > 30 GeV
-----------------------------------------------
Detector eta for EM Objects.

Exchange 17-Nov-2003:
Question (HTD): Are there any cuts on the EM Objects?
Answer    (HM): There are no additional cuts to the reconstructed objects.
                By cutting on large MET, we enhance our ability to isolate
                problems with the calorimeter.  If the calorimeter and its
                electronics were performing properly, we would
                expect distributions flat in phi and monotonic in eta.

Leading Jet, MET > 30 GeV
-------------------------
Highest Et Jet.

Exchange 17-Nov-2003:
Question (HTD): Are there any cuts on the Jet Objects?
Answer    (HM): No.

EM Objects, MET > 30 GeV
------------------------
EM Objects.

Exchange 17-Nov-2003:
Question (HTD): Are there any cuts on the EM Objects?
Answer    (HM): No.
```



CPS Clusters (All Clusters)

CPS Clusters (All Clusters)

NClus

Presumably the number of clusters in each event.
Drew writes: "[That] We have a bad problem with ghosts and havent turned on deghosting [is why so many clusters].

NStrips

Number of strips in those 3D clusters. Strips means "fibers".

Phi

Phi of CPS clusters

Z
-
Z position of 3D CPS clusters.
Drew notes: "This comes from crossing one axial cluster with one u cluster and one v cluster. As to the shape...thats more difficult. The dip in the center is due to the pathlength issue (same reason cft has lower efficiency at low eta), but the thing at the ends is odd...I am guessing its because the cal trigger coverage doesnt happen in the ICD.

RPhi Width

Width Of the clusters. Scale needs adjustment to eliminate underflows and overflows.

Z Width

What is the minimum unit?

dPhi(trk)

Delta phi with nearest track.

Phi (matched)

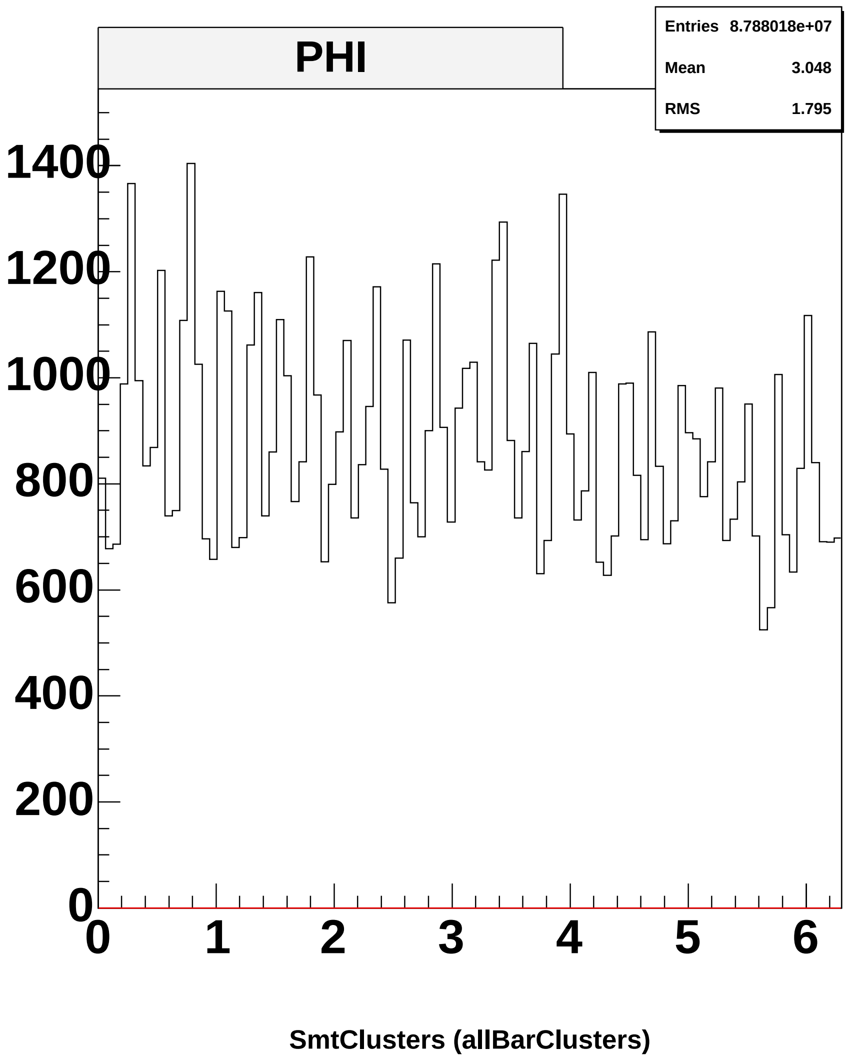
Phi of matched track. Criteriae are delta-phi < 0.05 and delta-z < 3.0.

Z (matched)

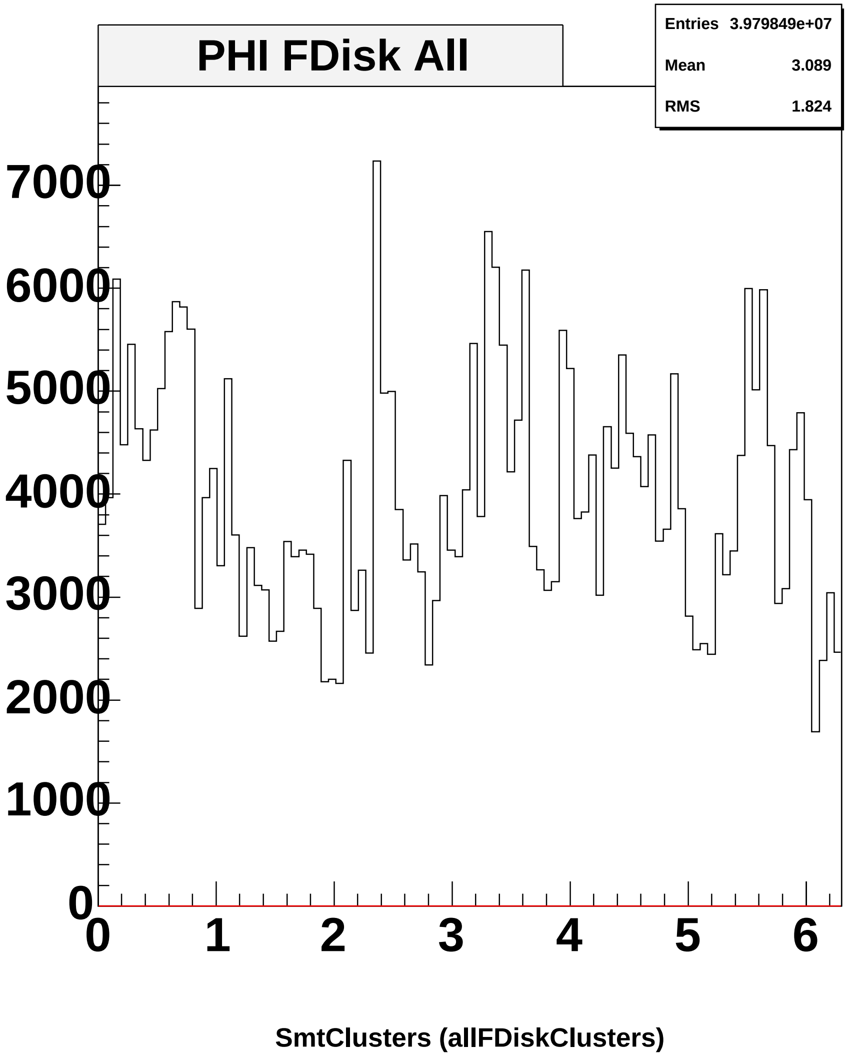
Z of matched track. Again, what is the criteria?

Drew notes: " I think the matching is wrong...it looks like they are matching z of the track rather than z at the preshower of the track. "

Later Drew wrote: " Harry and I spoke...he convinced me that the thing I called a 'matching problem'...the z(matched) distribution isnt that. We think it is because you used a run reco'd with p14.03.02...which has the cps calibration bug. He had a plot of data he reco'd with p14.05.00 and it looked much flatter for z. so you can remove that from the explanation. I (still) dont know what matching he used...but I would guess it's the same as for the dphi above. If I'm wrong I'm sure he'll let us know.



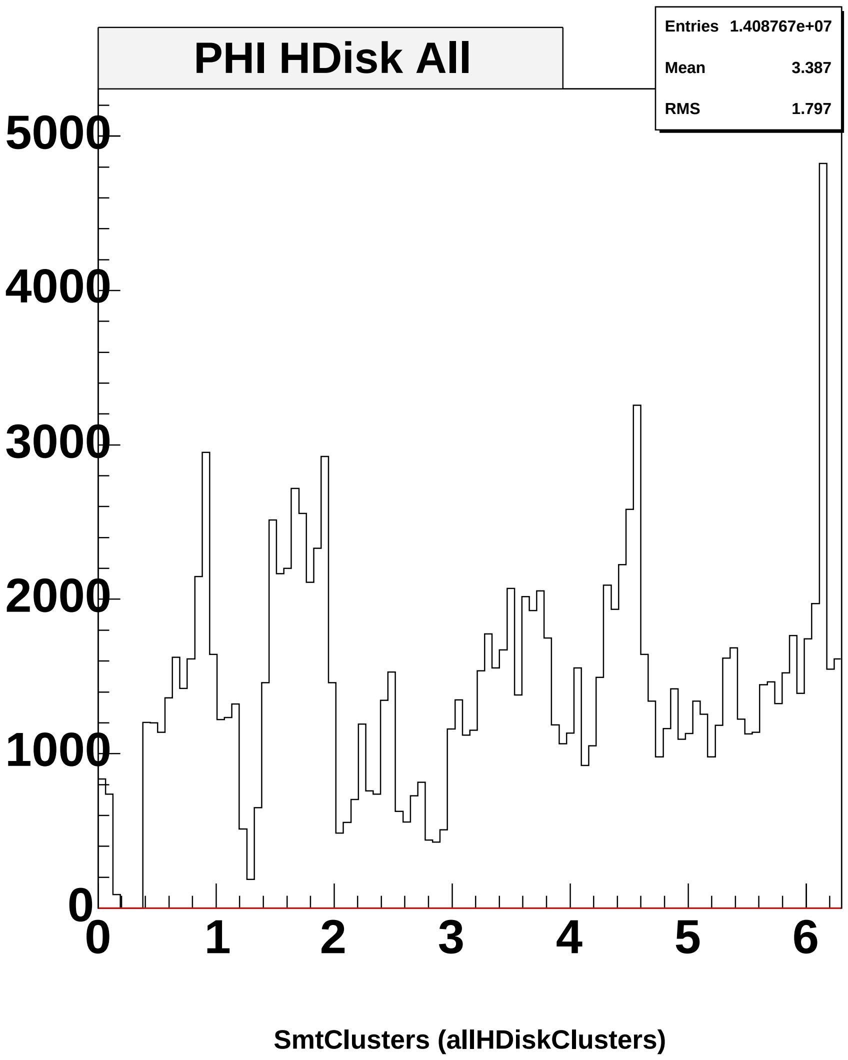

```
SMT Clusters (All Barrel Clusters)

Phi
---
All clusters.
```



Phi F-Disk All

SMT Clusters (All FDisk Clusters)

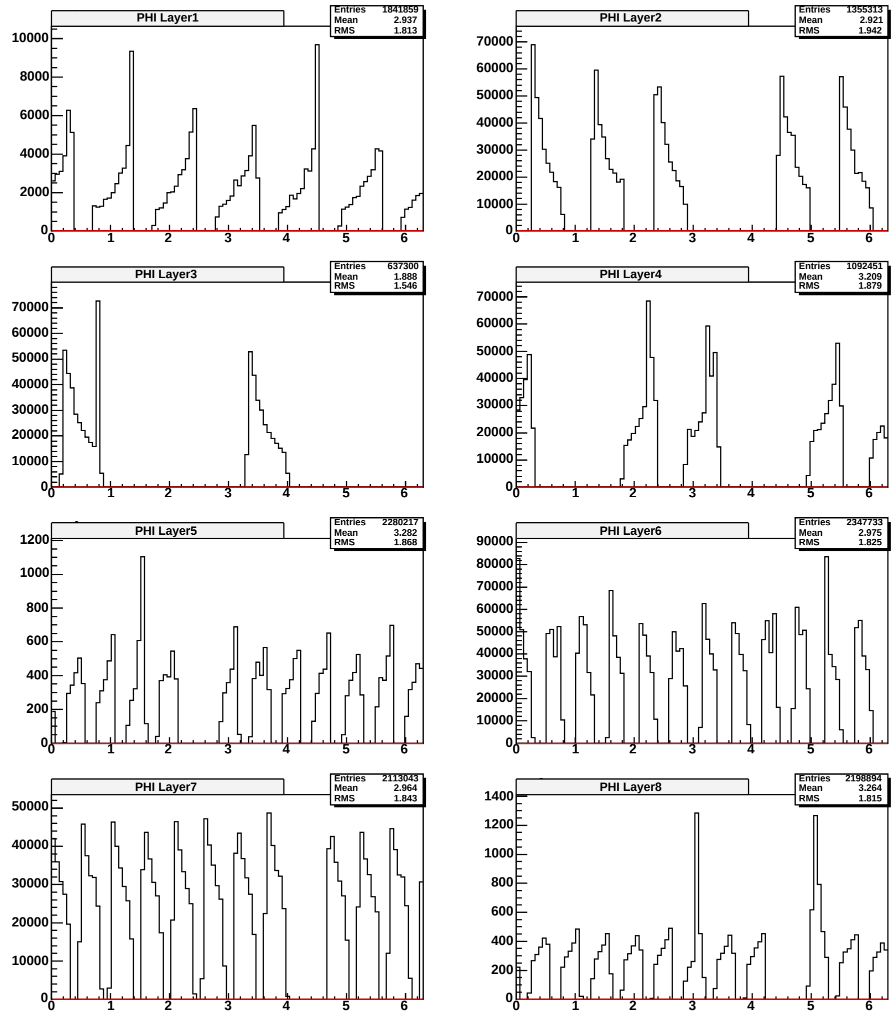
Umm, dur. Phi?



SMT Clusters (all H Disk Clusters)

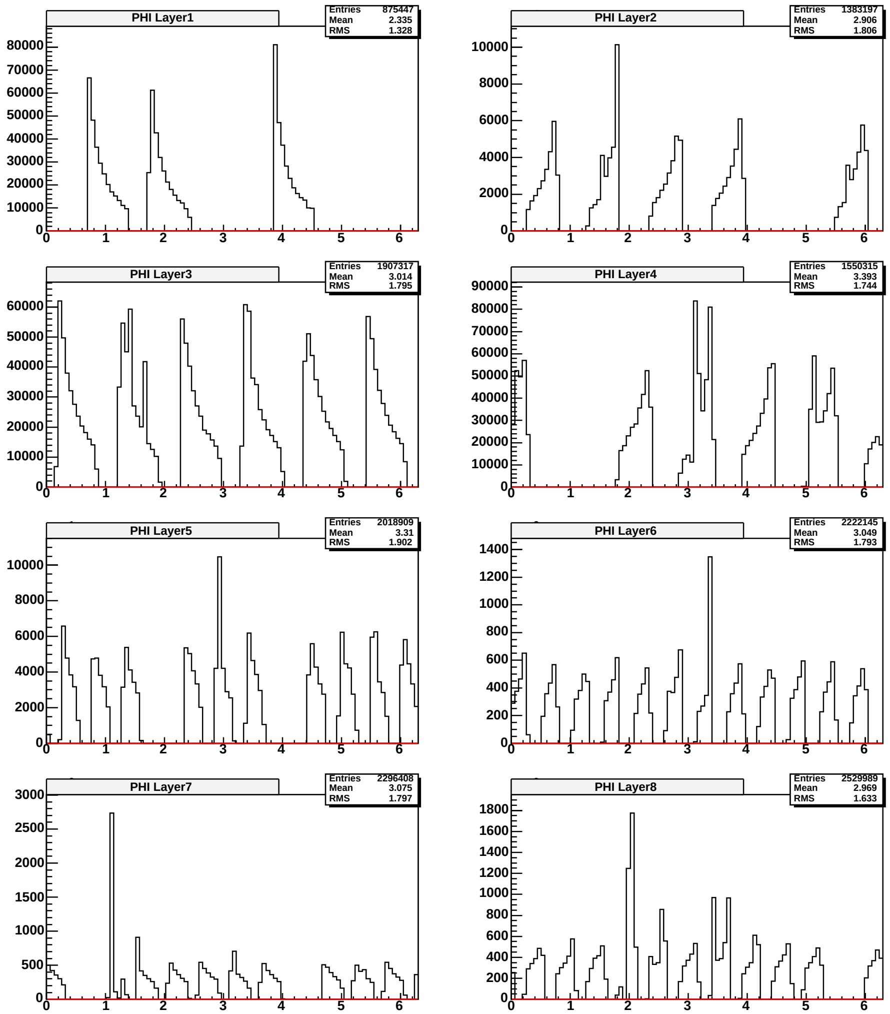
Phi HDisk All

Phi for all.



SmtClusters (ClustrBar1)


```
SMT Clusters (Barrel x)

So the SMT has 6 barrels. The first barrel is on one end of the
detector (in z) and the 6th on the other. I guess barrel one is
the S-most end detector.

      Layer: 1          2          3          4
Barrel:
  1          axial      axial      axial      axial
                        2 stereo              2 stereo
  2          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  3          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  4          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  5          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  6          axial      axial      axial      axial
                        2 stereo              2 stereo

Phi Layer x (x = 1 to 8)
------------------------
I suppose the 8 layers 2 rows of each of 4 layers from
above table. I don't quite understand why, for instance,
barrel one has 8 filled histograms when layer 1 and 3
are single-sided, though. Why's that?

Michael Weber writes:
"SMT Barrel 1 Phi:
There are 4 Layers (super-layers)  with 2 staggered sublayers (layers) each.
So there are 8 Layers per barrel -> 8 plots.
You can see the staggering looking at the sublayers within a super-layer
vs. phy (cool !).
The two 'sublayers' are built with the same sensor type.
Super-layer 1 the same as 3, 2 the same as 4.
- 1 and 2 are made of 6 device sublayers.
- 3 and 4 are made of 12 device sublayers.
barrel 1 and 6, super-layer 1 and 3 contain single sided devices,
all the others are double sided.
One can nicely (sadly) see the dead devices from the plots.
I'm not sure I yet understood why the distributions are not flat within
one device,
have to look at them for some more time...
```



SmtClusters (ClustrBar2)

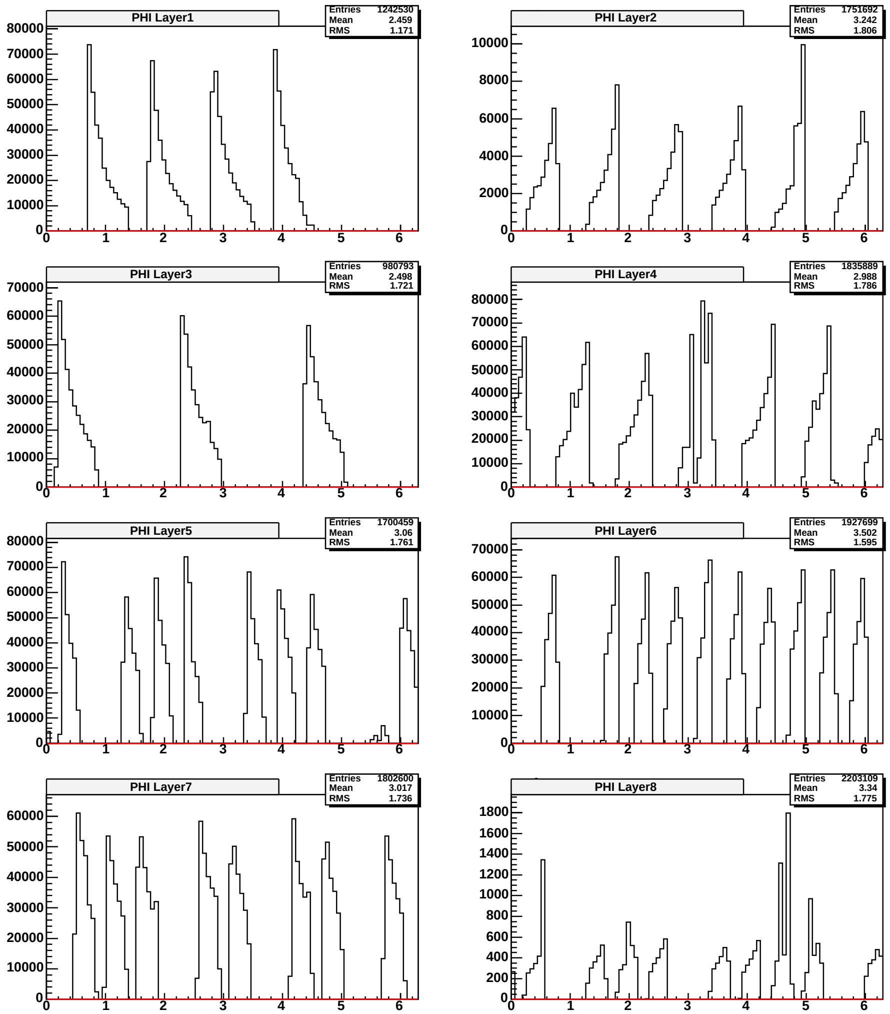
SMT Clusters (Barrel x)

So the SMT has 6 barrels. The first barrel is on one end of the detector (in z) and the 6th on the other. I guess barrel one is the S-most end detector.

```
      Layer: 1          2          3          4
Barrel:
  1          axial      axial      axial      axial
                        2 stereo              2 stereo
  2          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  3          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  4          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  5          axial      axial      axial      axial
             90 stereo  2 stereo              2 stereo
  6          axial      axial      axial      axial
                        2 stereo              2 stereo
```

Phi Layer x (x = 1 to 8)

I suppose the 8 layers 2 rows of each of 4 layers from above table. I don't quite understand why, for instance, barrel one has 8 filled histograms when layer 1 and 3 are single-sided, though. Why's that?



SmtClusters (ClustrBar3)

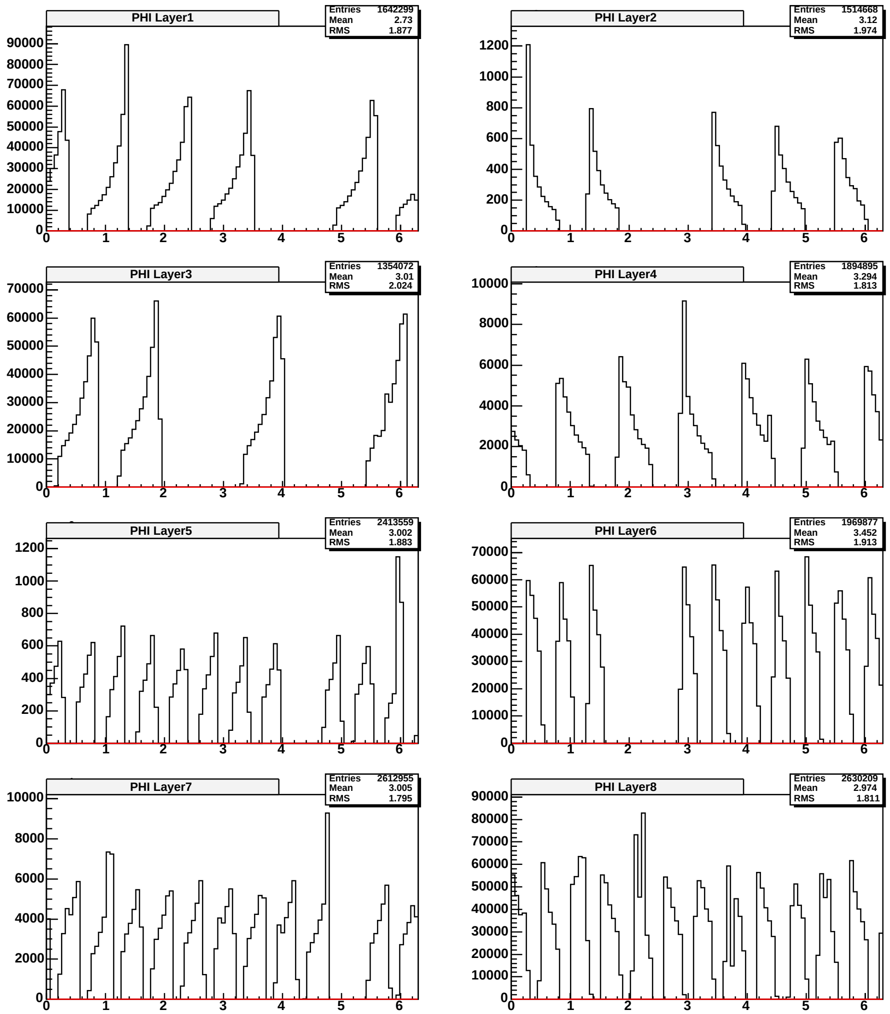
SMT Clusters (Barrel x)

So the SMT has 6 barrels. The first barrel is on one end of the detector (in z) and the 6th on the other. I guess barrel one is the S-most end detector.

Barrel: \ Layer:	1	2	3	4
1	axial	axial	axial	axial
		2 stereo		2 stereo
2	axial	axial	axial	axial
	90 stereo	2 stereo		2 stereo
3	axial	axial	axial	axial
	90 stereo	2 stereo		2 stereo
4	axial	axial	axial	axial
	90 stereo	2 stereo		2 stereo
5	axial	axial	axial	axial
	90 stereo	2 stereo		2 stereo
6	axial	axial	axial	axial
		2 stereo		2 stereo

Phi Layer x (x = 1 to 8)

I suppose the 8 layers 2 rows of each of 4 layers from above table. I don't quite understand why, for instance, barrel one has 8 filled histograms when layer 1 and 3 are single-sided, though. Why's that?



SmtClusters (ClustrBar4)

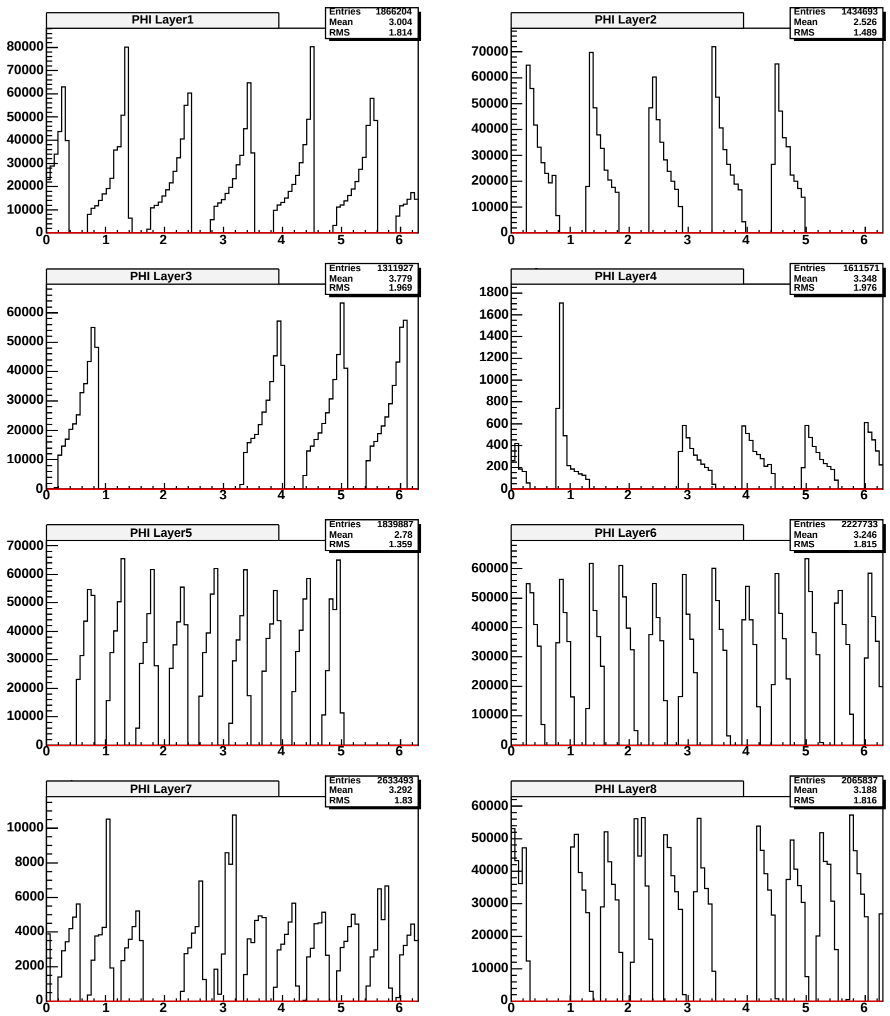
SMT Clusters (Barrel x)

So the SMT has 6 barrels. The first barrel is on one end of the detector (in z) and the 6th on the other. I guess barrel one is the S-most end detector.

Barrel: \ Layer:	1	2	3	4
1	axial	axial 2 stereo	axial	axial 2 stereo
2	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
3	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
4	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
5	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
6	axial	axial 2 stereo	axial	axial 2 stereo

Phi Layer x (x = 1 to 8)

I suppose the 8 layers 2 rows of each of 4 layers from above table. I don't quite understand why, for instance, barrel one has 8 filled histograms when layer 1 and 3 are single-sided, though. Why's that?



SmtClusters (ClustrBar5)

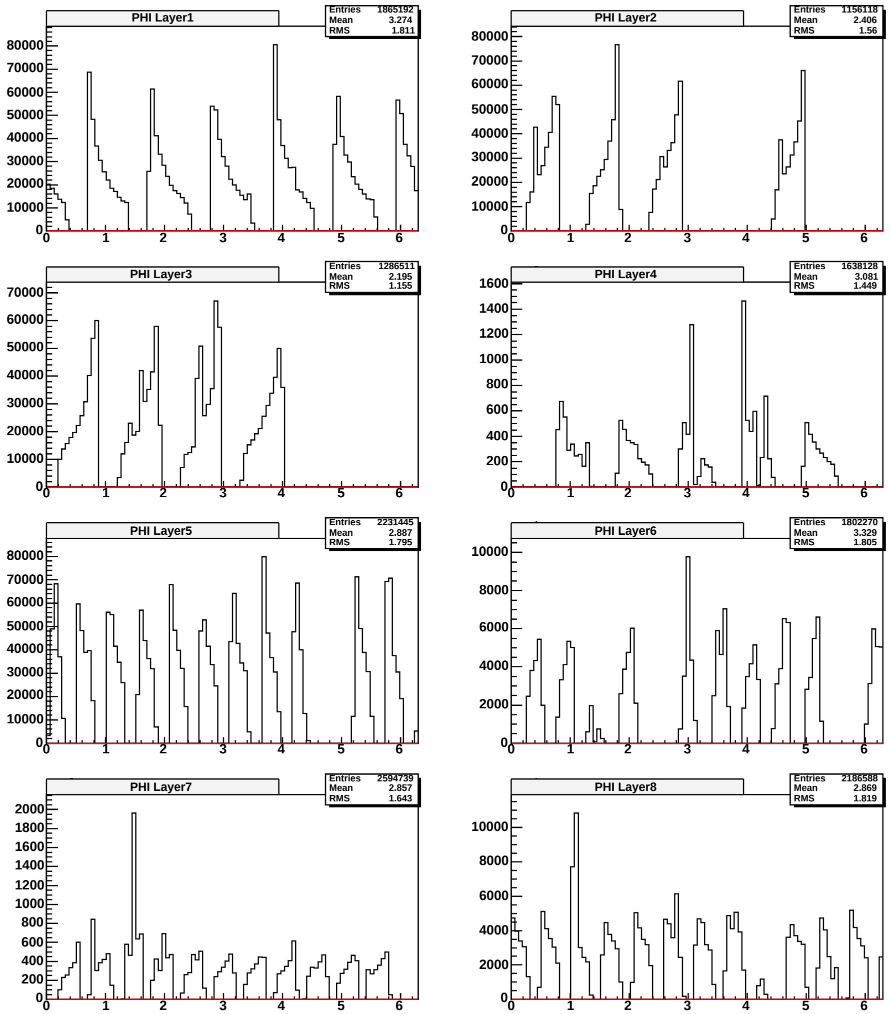
SMT Clusters (Barrel x)

So the SMT has 6 barrels. The first barrel is on one end of the detector (in z) and the 6th on the other. I guess barrel one is the S-most end detector.

Barrel: \ Layer:	1	2	3	4
1	axial	axial 2 stereo	axial	axial 2 stereo
2	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
3	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
4	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
5	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
6	axial	axial 2 stereo	axial	axial 2 stereo

Phi Layer x (x = 1 to 8)

I suppose the 8 layers 2 rows of each of 4 layers from above table. I don't quite understand why, for instance, barrel one has 8 filled histograms when layer 1 and 3 are single-sided, though. Why's that?



SmtClusters (ClustrBar6)

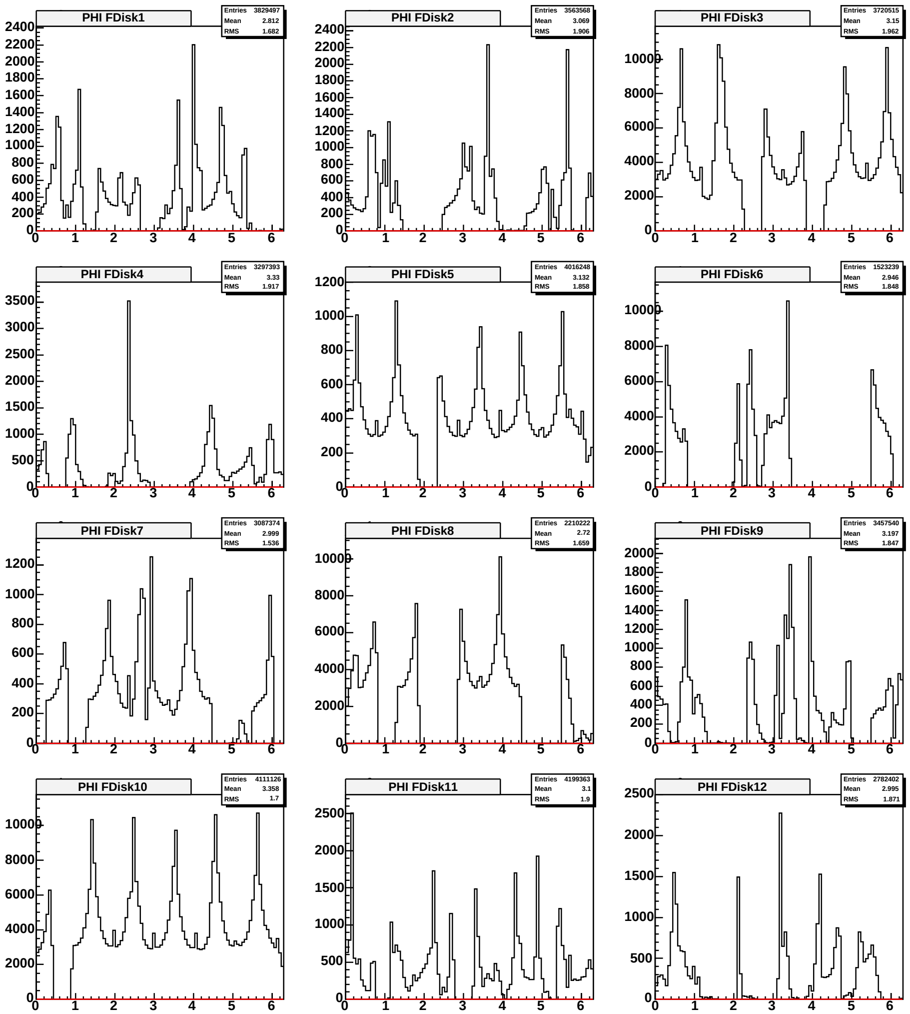
SMT Clusters (Barrel x)

So the SMT has 6 barrels. The first barrel is on one end of the detector (in z) and the 6th on the other. I guess barrel one is the S-most end detector.

Barrel:	Layer: 1	2	3	4
1	axial	axial 2 stereo	axial	axial 2 stereo
2	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
3	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
4	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
5	axial 90 stereo	axial 2 stereo	axial	axial 2 stereo
6	axial	axial 2 stereo	axial	axial 2 stereo

Phi Layer x (x = 1 to 8)

I suppose the 8 layers 2 rows of each of 4 layers from above table. I don’t quite understand why, for instance, barrel one has 8 filled histograms when layer 1 and 3 are single-sided, though. Why’s that?



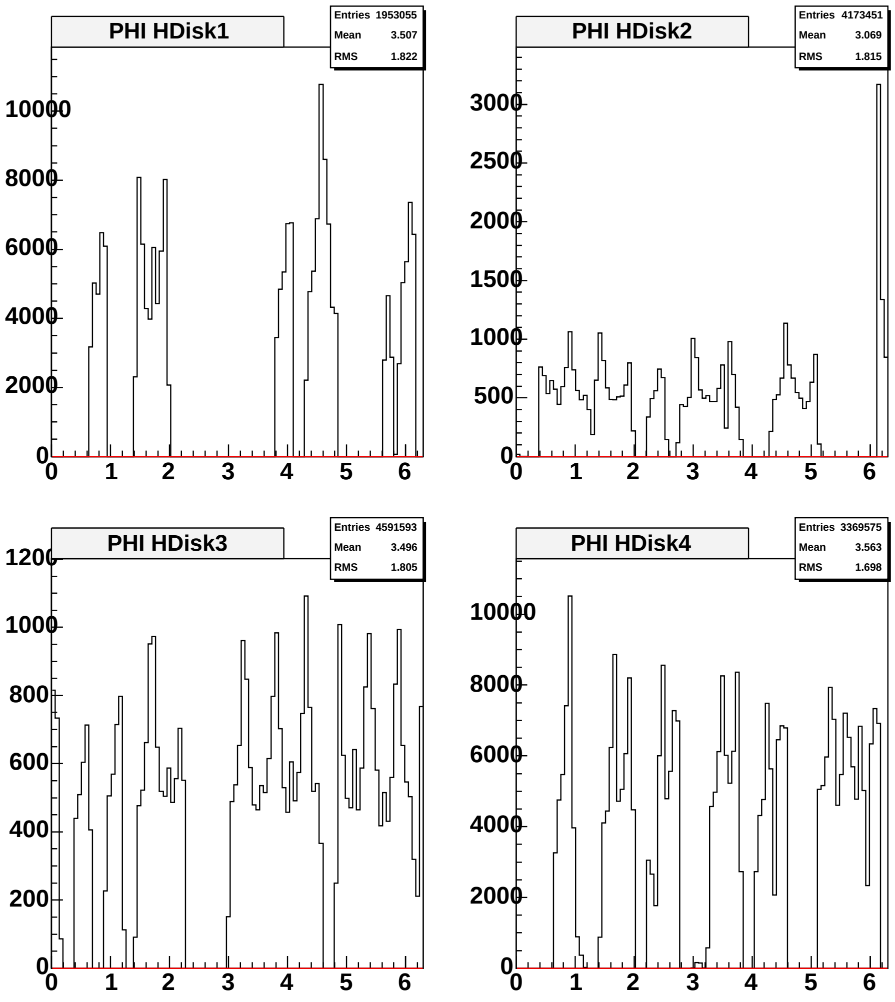
SmtClusters (FDiskClusters)

SMT Clusters (FDisk)

There are 12 F-Disks, four on each end of the barrel and 4 in-between barrel modules.

Phi FDisk n (n=1 to 12)

Umm, phi?



SmtClusters (HDiskClusters)

SMT Clusters (H Disk Clusters)

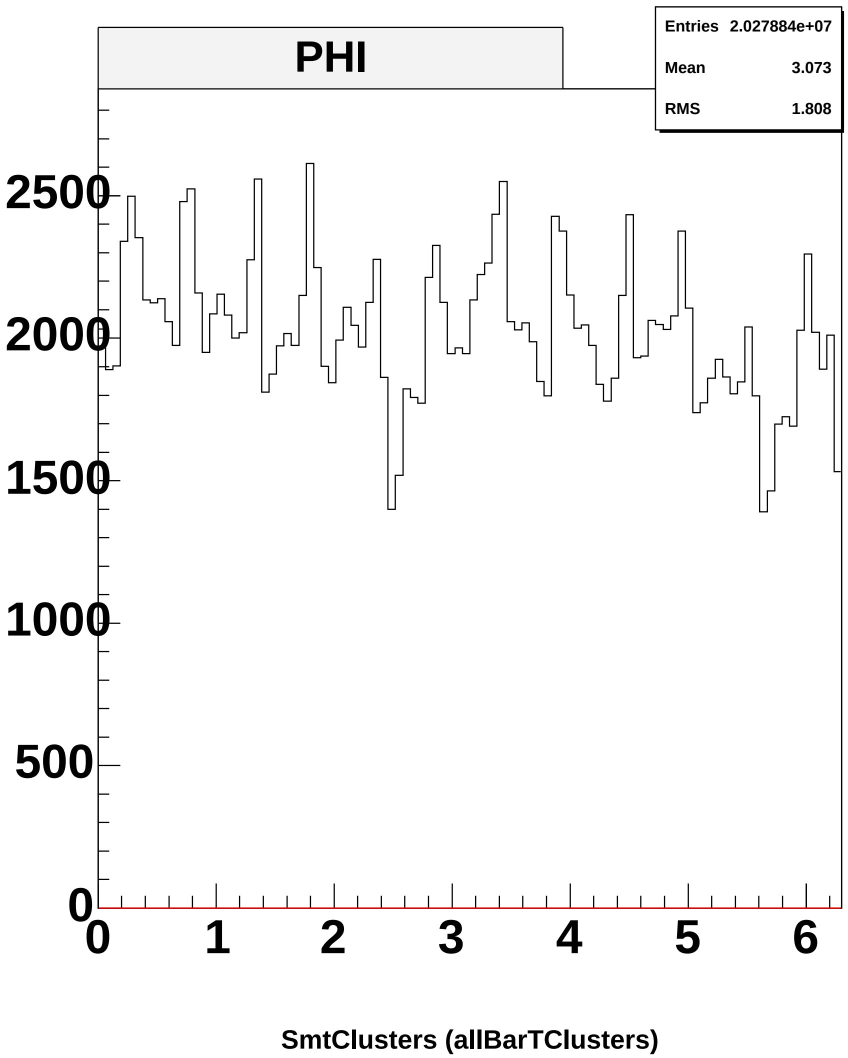
There are 4 H-disks.

Phi HDisk 1

Phi HDisk 2

Phi HDisk 3

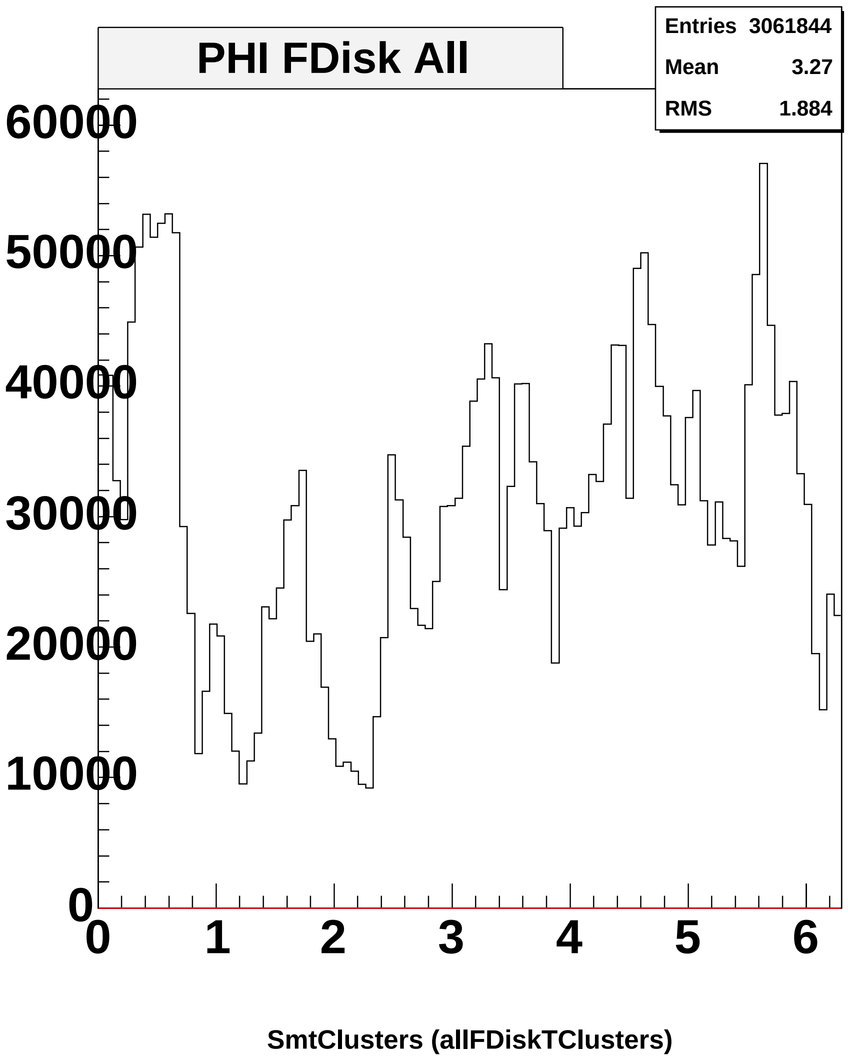
Phi HDisk 4



SMT Clusters (All Barrel T-clusters)

What's a T-cluster? A cluster used on a track? Yes.

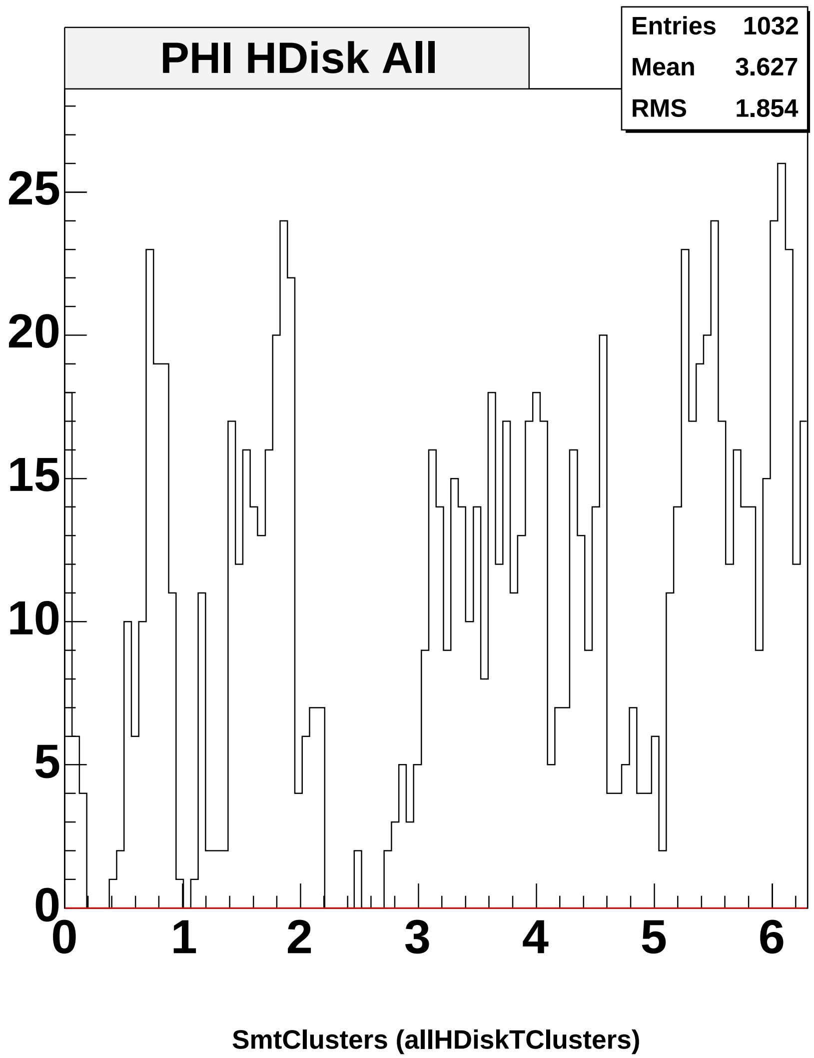
Phi
---
0 to 2pi.



Phi F-Disk All

SMT Clusters (all FDisk TClusters)

Phi of SMT clusters on tracks.



SMT Clusters (H Disk Clusters on Tracks)

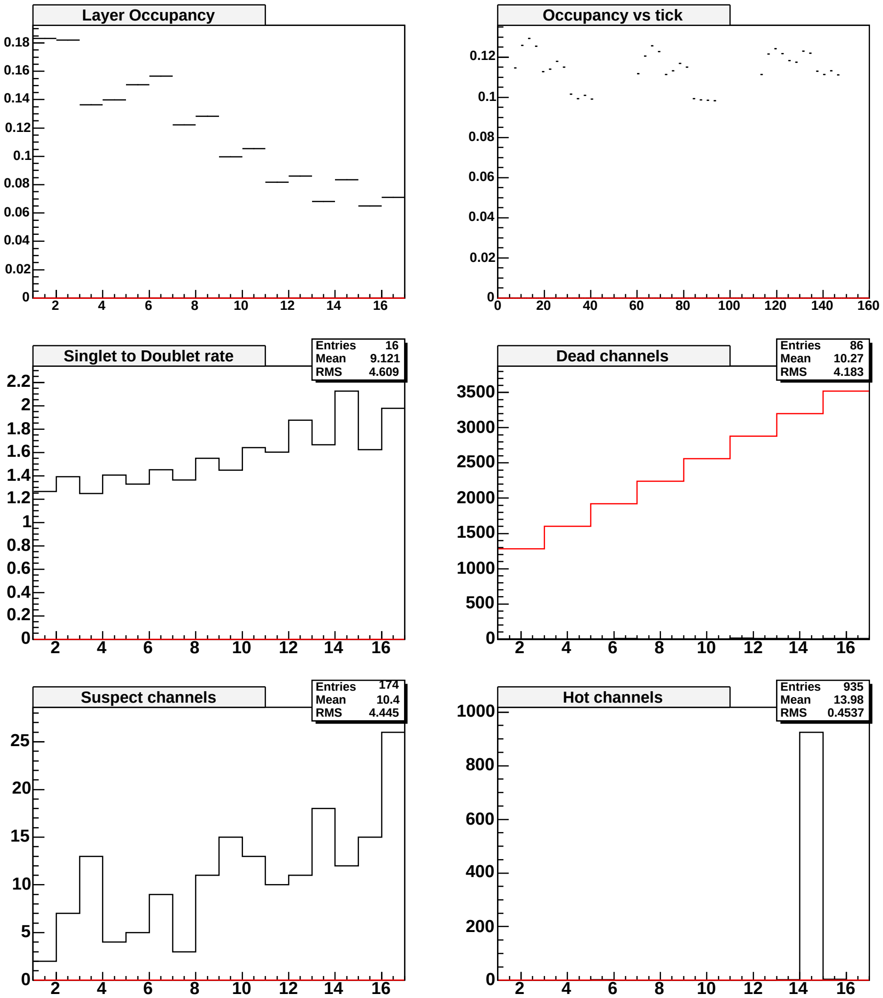
There are 4 H-disks.

Phi HDisk 1

Phi HDisk 2

Phi HDisk 3

Phi HDisk 4



CFT Summary (All Clusters)

CFT Summary All Clusters

Layer Occupancy

Mean layer occupancy for the 8x2 CFT layers.

Occupancy vs. Tick

Mean occupancy for each of the 36 ticks with beam.

Singlet to Doublet Rate

I presume this is the number of singlets divided by the number of doublets in each layer.

Harry M. writes:
"The singlet to doublet ratio is hard to predict. It depends on issues like noise, VPLC gain, the geometry of the doublet layers (the amount of overlap between singlet layers) and the incident angle of tracks. The reason this plot exists is it allows us to monitor the stability of the detector in a way that is sensitive to all of these effects. The saw-tooth is probably due to "axial" vs "stereo" layers."

Andrew Askew notes:
" Singlet to doublet rate should be calculable from the geometry, but I don't think that is what we see in data. The weird axial/stereo, as you go higher corresponds to the effect of the flat ADC cut on cassettes with different gains."

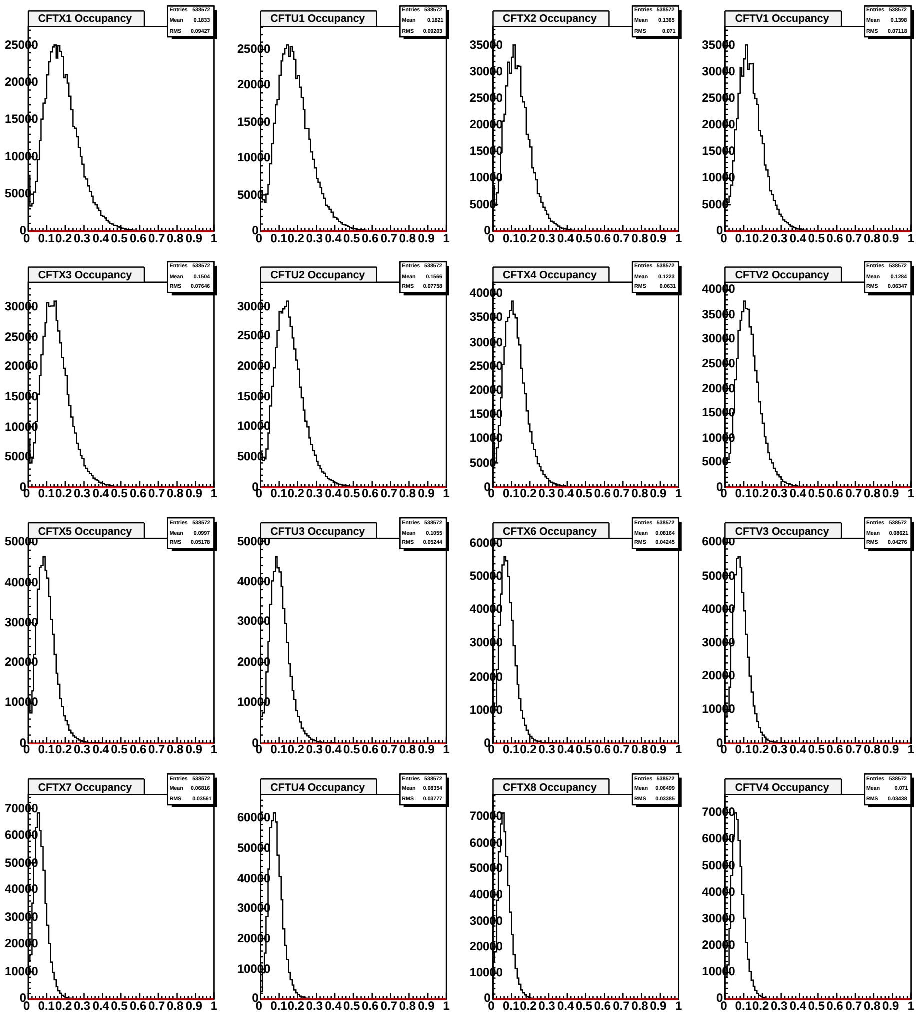
Dead Channels

This looks like it has counted the channels in each layer and called them all dead.

Suspect Channels

Harry M. writes:
"Hot vs dead vs suspect - You need to run "many events" to get these distributions to have real meaning (30K?). Dead means that channel has less than 1% occupancy as compared to other channels. Hot means the channel has more than 1.3 times the average occupancy of other channels. Suspect means the channel has less than 70% the occupancy as compared to the average."

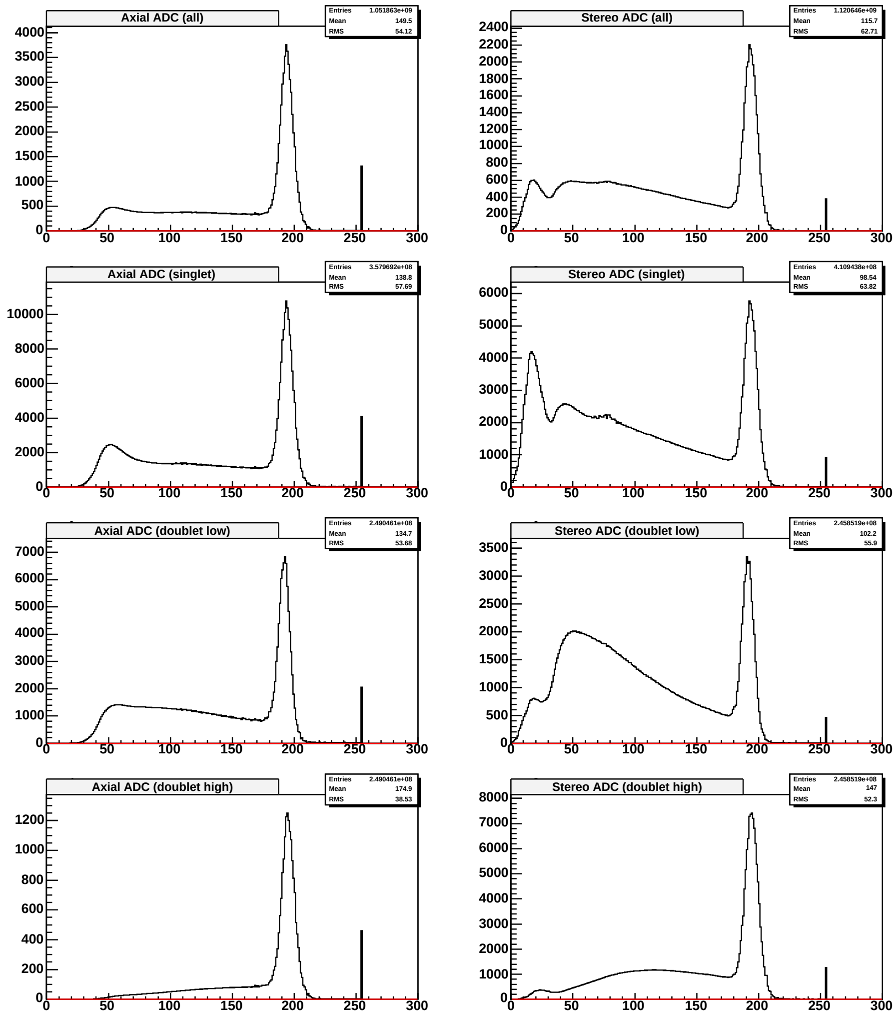
Hot Channels



Cft Occupancy (All Clusters)

CFT Occupancy (All Clusters)

These 16 plots show the fractional occupancy in each of the 8 CFT layers in x and u sublayers. We expect some luminosity dependence and it will be interesting to track. This is worth the trouble if some Offline shifter wants to do it. Give me an email. -HTD



CFT ADC Summary (All Clusters)

CFT ADC Summary (All Clusters)

Melanson writes:
"The ADC distributions are for single fibers, separated by whether that fiber was in a singlet or doublet cluster. Thus, the ADC distributions should look similar for REAL hits. However, noise hits will have different ADC distributions. In addition, there may be subtle differences between singlets and doublets because the probability of forming a singlet or doublet will depend on the incident angle of the track, and the that can have an impact on the amount of light (and thus the ADC value). The general shape of this distribution (as I understand it) is a Landau + a bump at low ADC value that might be noise + a spike at "255" representing overflows (large signals)."

Andrew Askew notes:
The shape of the curves should be understandable given a couple of facts.

1.) The low edge varies depending on the individual channel by channel pedestal subtraction. Combine that with the varying pedestal position by tick, and sometimes you get some pedestal (and a noise hit), and sometimes you don't (oversuppress). That gives you your left hand lump.

2.) We get a LOT of light in the CFT, and where the gains are set right now, a LOT of the time the ADC overflows (254). Then you subtract pedestals that vary from channel to channel, and your overflow spike becomes a nice peak (that's your right hand side lump).

3.) There is a spike at what I presume is 255. That should be an error condition.

Axial ADC All

Stereo ADC All

There is no reason I can think of why axial should look different from stereo.

Axial ADC Singlet

Stereo ADC Singlet

Axial ADC Doublet Low

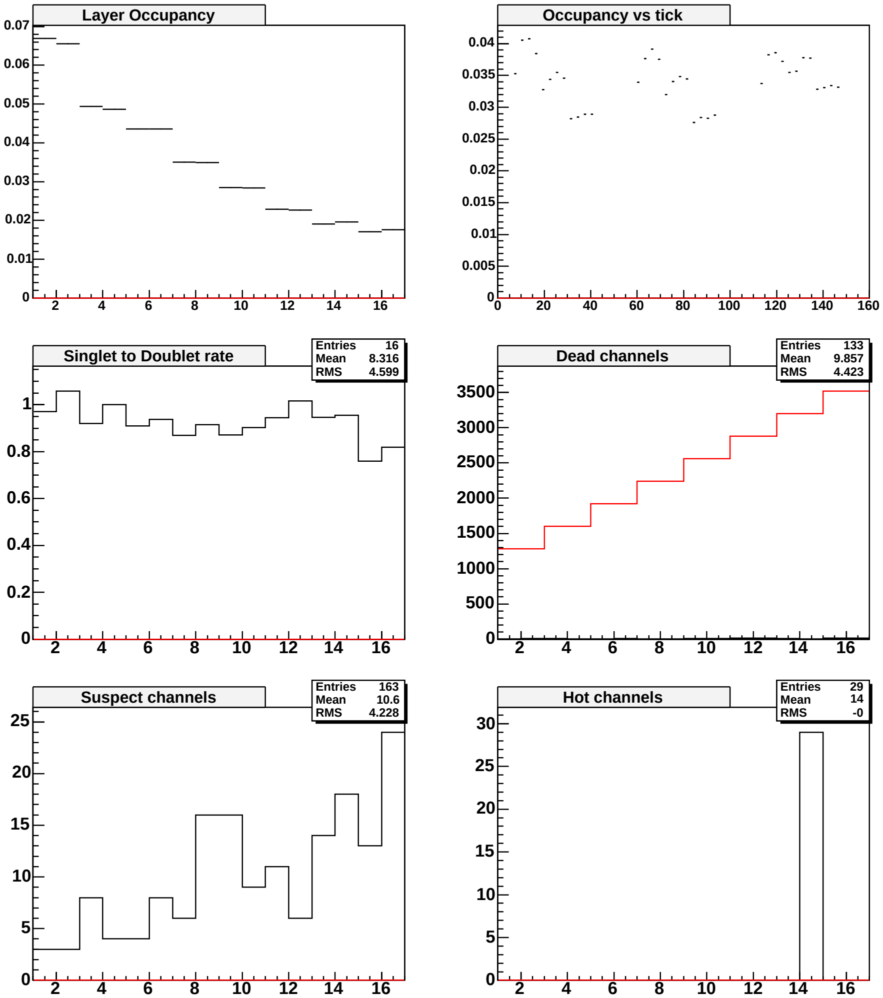
"Low" is the low-valued ADC hit.

Stereo ADC Doublet Low

Axial ADC Doublet High

"High" is the high-valued ADC hit.

Stereo ADC Doublet High



CFT Summary (Clusters on tracks)

CFT Summary All Clusters

Layer Occupancy

Mean layer occupancy for the 8x2 CFT layers.

Occupancy vs. Tick

Mean occupancy for each of the 36 ticks with beam.

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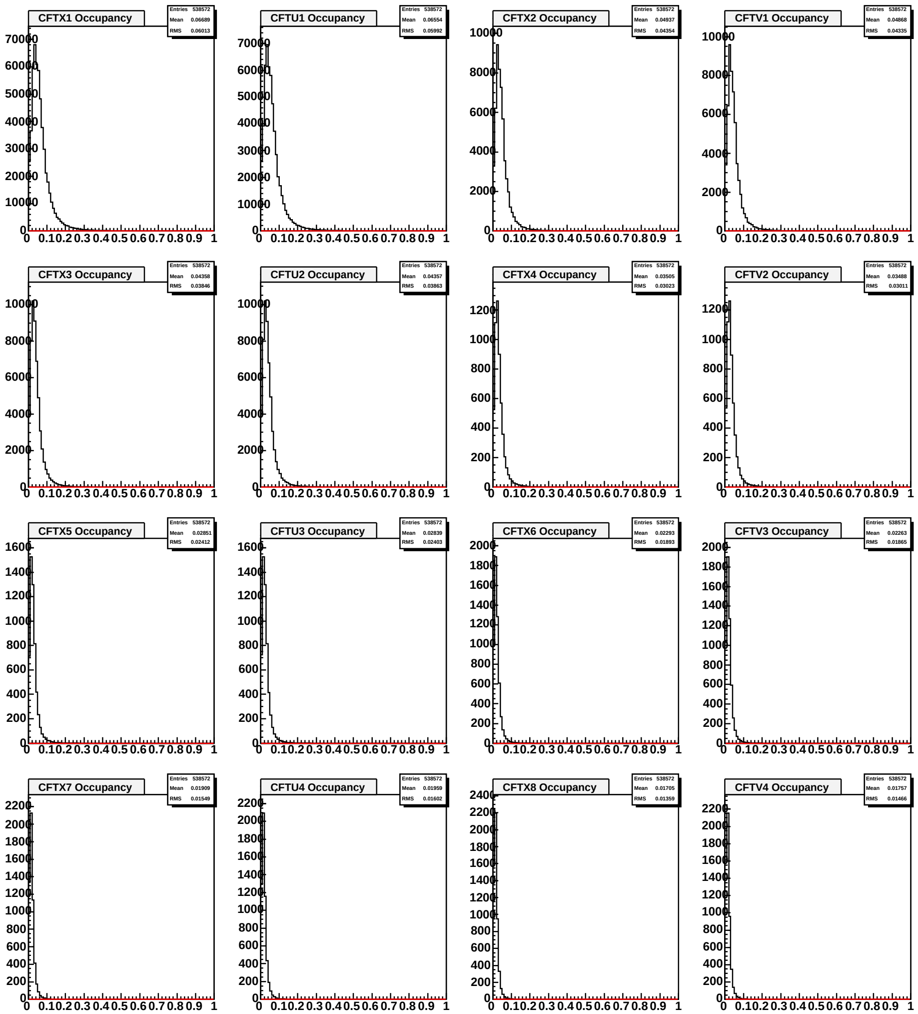
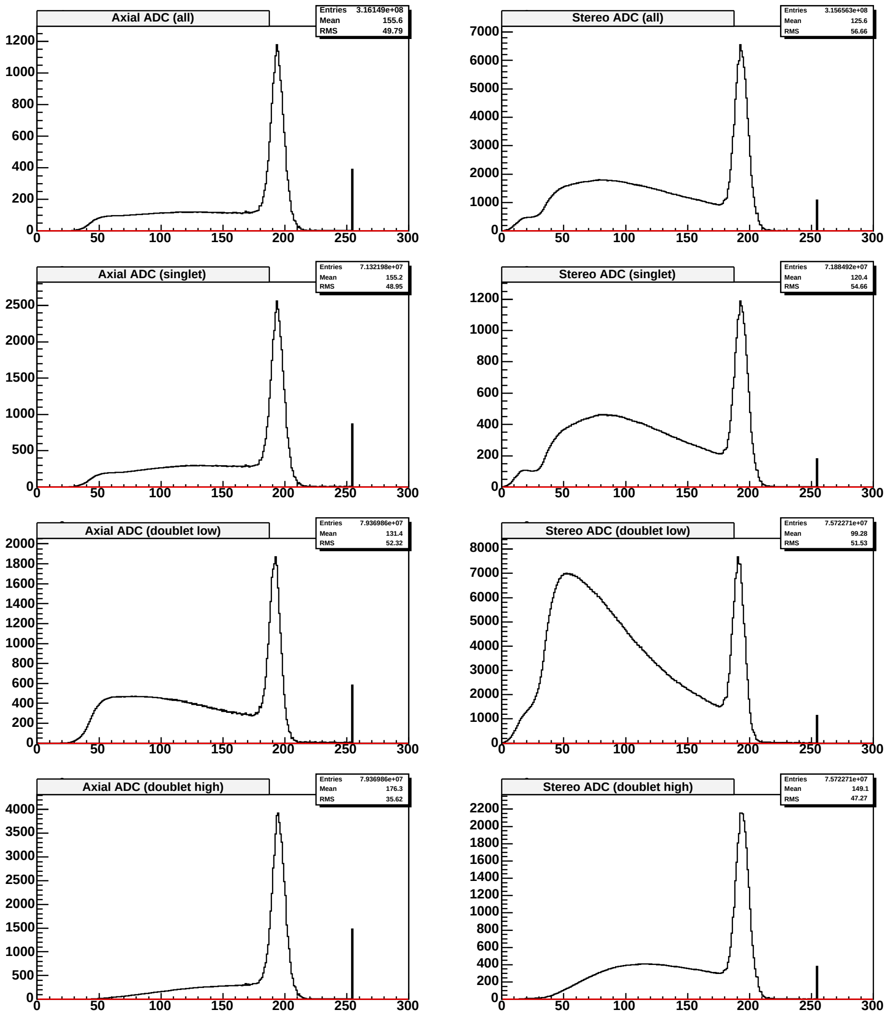
Hot Channels



Cft Occupancy (Clusters on tracks)

CFT Occupancy (Track Clusters)

These 16 plots show the fractional occupancy in each of the 8 CFT layers in x and u sublayers. We expect some luminosity dependence and it will be interesting to track. This is worth the trouble if some Offline shifter wants to do it. Give me an email. -HTD



CFT ADC Summary (Clusters on tracks)

CFT ADC Summary (Trk Clusters)

Melanson writes:
"The ADC distributions are for single fibers, separated by whether that fiber was in a singlet or doublet cluster. Thus, the ADC distributions should look similar for REAL hits. However, noise hits will have different ADC distributions. In addition, there may be subtle differences between singlets and doublets because the probability of forming a singlet or doublet will depend on the incident angle of the track, and the that can have an impact on the amount of light (and thus the ADC value). The general shape of this distribution (as I understand it) is a Landau + a bump at low ADC value that might be noise + a spike at "255" representing overflows (large signals)."

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The shape of the curves should be understandable given a couple of facts.

1.) The low edge varies depending on the individual channel by channel pedestal subtraction. Combine that with the varying pedestal position by tick, and sometimes you get some pedestal (and a noise hit), and sometimes you don't (oversuppress). That gives you your left hand lump.

2.) We get a LOT of light in the CFT, and where the gains are set right now, a LOT of the time the ADC overflows (254). Then you subtract pedestals that vary from channel to channel, and your overflow spike becomes a nice peak (that's your right hand side lump).

3.) There is a spike at what I presume is 255. That should be an error condition. Note that the red histogram shows NO ADC activity since there were no hits.

Axial ADC All

Stereo ADC All

There is no reason I can think of why axial should look different from stereo.

Axial ADC Singlet

Stereo ADC Singlet

Axial ADC Doublet Low

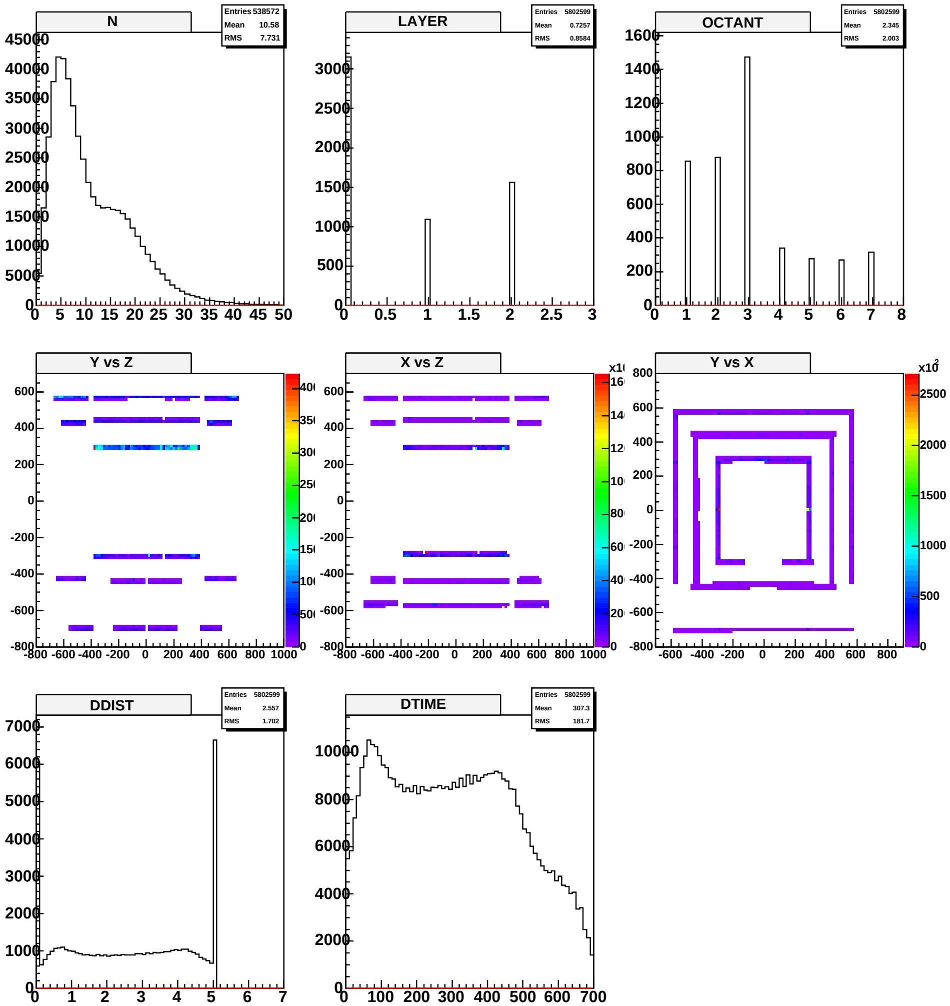
"Low" is the low-valued ADC hit.

Stereo ADC Doublet Low

Axial ADC Doublet High

"High" is the high-valued ADC hit.

Stereo ADC Doublet High



MuonPDT (All)

Muon PDT (All)

Plots for the central muon drift chambers.

N

The number of PDT hits per event.

Layer

Layer 0 is A-layer. layer 1 and 2 are B and C layers.

Octant

Integrated over layer. The reason octants 0 and 3 are highest is that the A-layer chambers span 2 octants (0+7 and 3+4) because of their large size. These are 013, 023, 033, 010, 020, ans 030. The A-layer has the most hits.

Y vs Z

Occupancy. The units are CM. +Y is up. +Z is South. +X is East.

X vs Z

Occupancy.

Y vs X

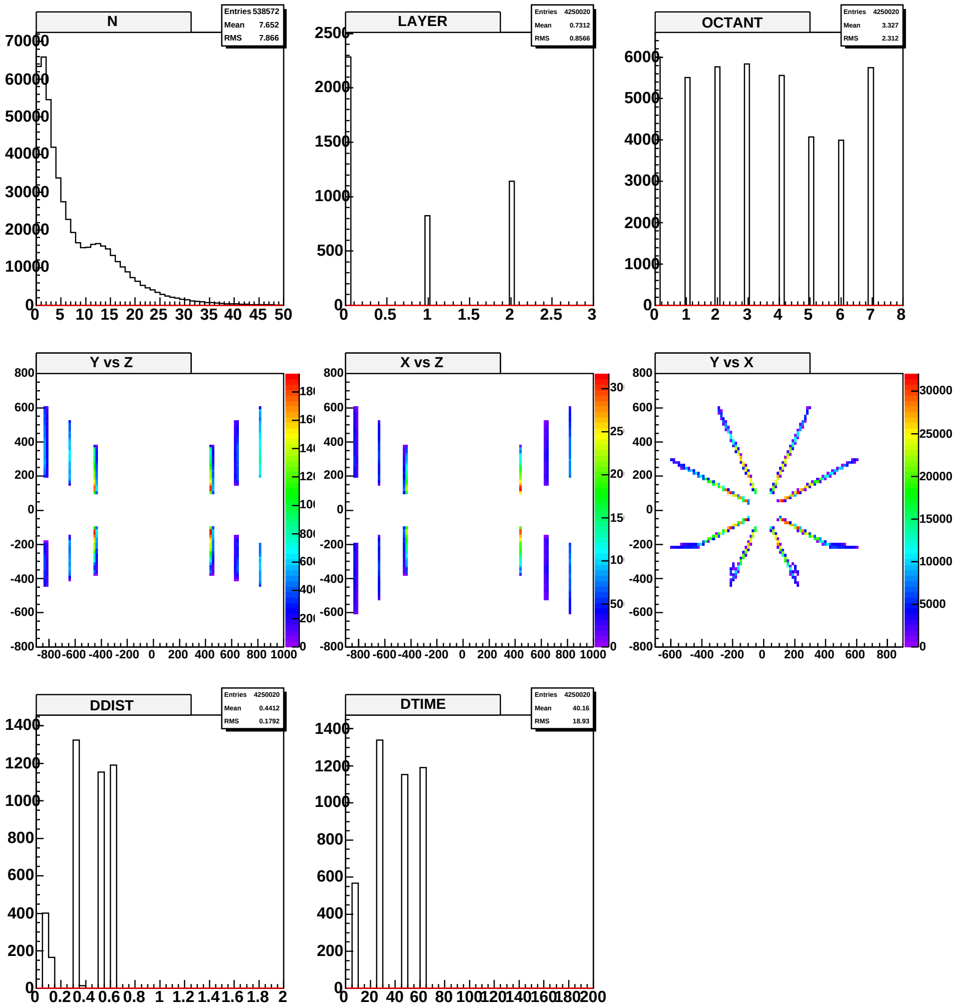
Occupancy.

DDist

Drift distance in cm. I gather that the spikes at 0 and 5 cm are from times that convert to negative distance or off the edge of the cell and are put on the wire or at the edge of the cell.

DTime

Drift time in ns.



MuonMDT (All)

Muon(MDT)

Detailed information about occupancy in MDT system.

N

The number of hits in the MDT system.

Layer

The layer in between the calorimeter and forward toroid magnets is the A-Layer. The B-Layer is first layer outside the toroids. The C-layer is farthest from the interaction point. 0=> A-layer. 1=>B-Layer. 2=>C-layer.

Octant

Octants 0 to 7 occupancy. Octants 5 & 6 are a little smaller than the others because the sidewalk cuts out acceptance in the B & C-layers.

Y vs Z

Occupancy distribution. N is (-z) direction & S is (+z) direction. The x-axis is z-hat.

X vs Z

Occupancy distribution. The x-axis is z-hat. Positive x is eastward.

X vs Y

Integrating over all layers. The distribution is because the hits are plotted at the centers of the wires.

DDist

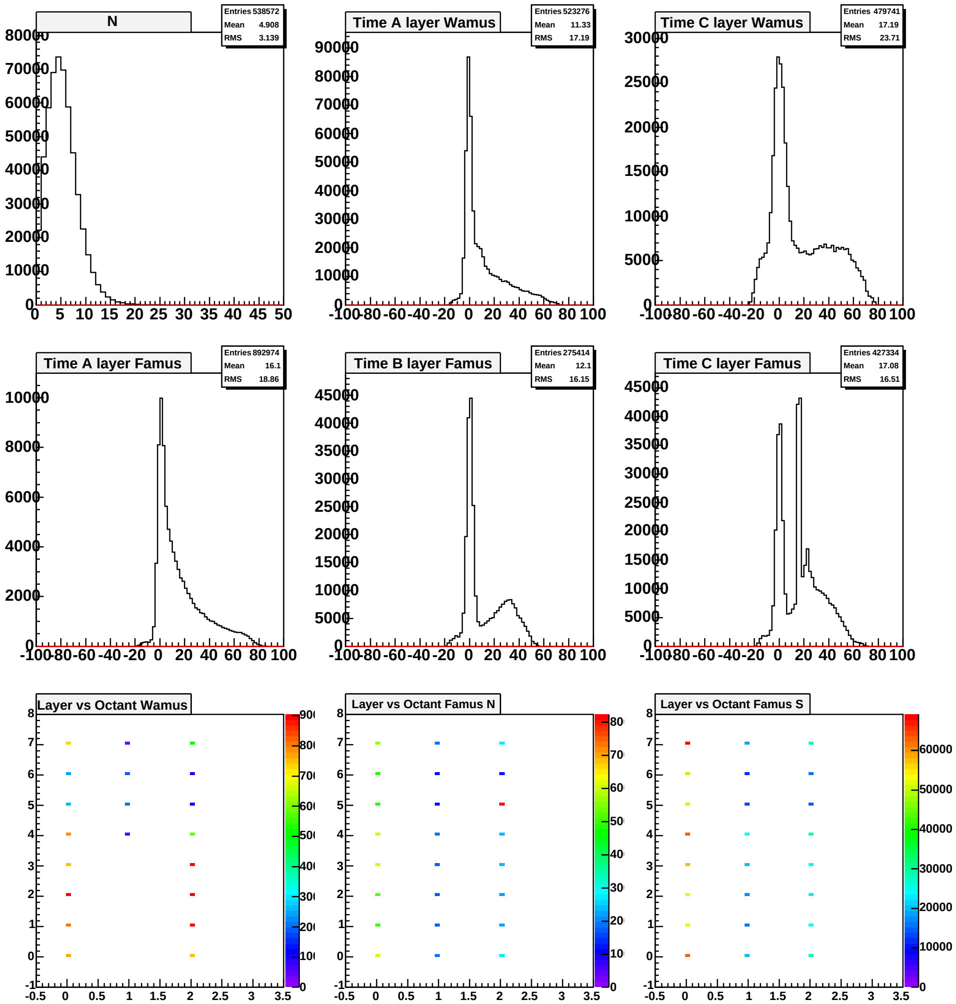
The drift distance in cm.

Exchange 02-May-2003:
Question (HTD): I don't understand this distribution even though I understand there are only 6 bins in the time readout.
Answer (DD): It should have 6 bins as you pointed out. It could be that somebody is using part of the TDR program which supposed to be used for MC generation: finding dtime using ddist. In this case the plot will look about the same as it is. It makes no sense to have such plot for analysis of reco results of real data.

DTime

The drift time (ns).

Exchange 02-May-2003:
Question (HTD): I thought there were 6 bins in the time readout.
Answer (DD): See above.



MuonMSC (All)

Muon MSC

Plots for the muon scintillator.

N

The number of scintillator hits per event.

Time A Layer WAMUS

T0-subtracted time in the A-phi counters. The muons should arrive at T=0 ns. There might be a discernable peak at t=14 ns from background originating at the calorimeter exit near the beampipe and arriving in the A-phi counters around the edge of the central.

Time C Layer WAMUS

T0-subtracted time in ns. The peak at T=0 ns is from muons. The little blur between -60 and -40 ns indicated a bad SFE. This SFE was replaced after the data was taken.

Time A layer FAMUS

T0-subtracted time in ns. Muons arrive at T=0 ns.

Time B layer FAMUS

T0-subtracted time in ns. Muons arrive at T=0 ns.

Time C layer FAMUS

T0-subtracted time in ns. Muons arrive at T=0 ns.

Layer vs Octant WAMUS

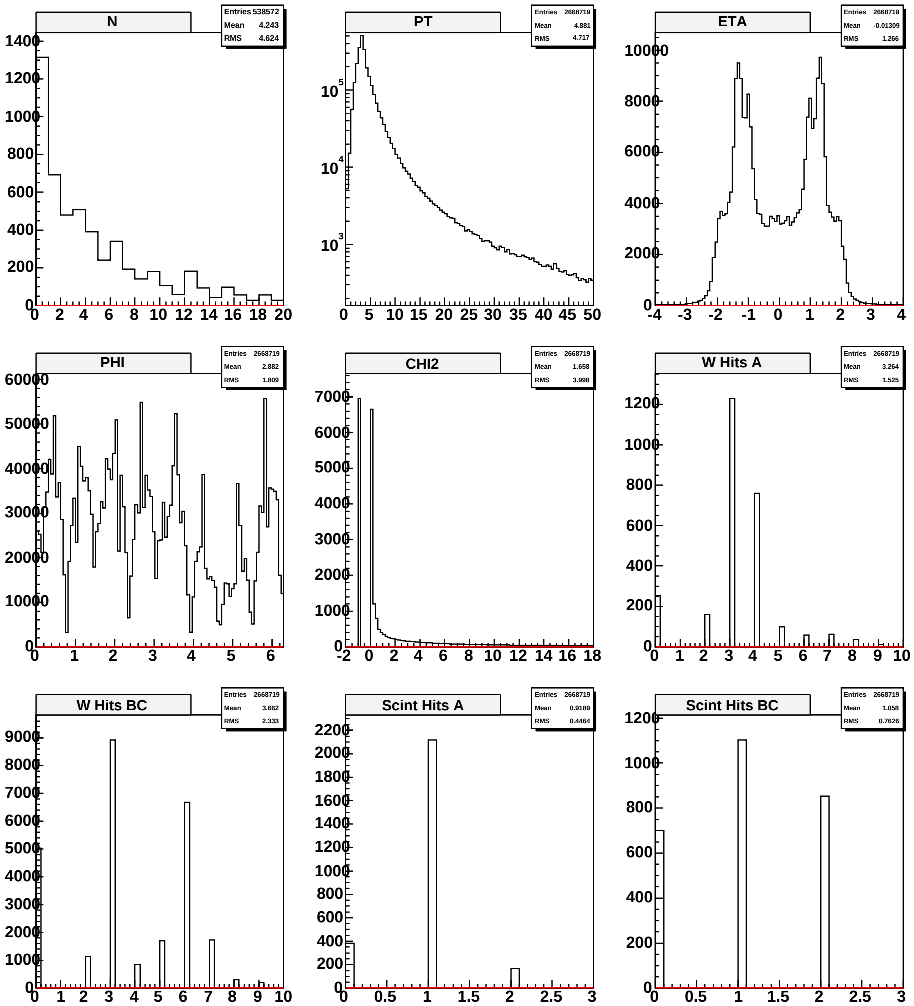
Occupancy plot. Layer 0 is A-layer. Layers 1 and 2 are B and C Layers. Octants are on the y-axis. There is B-layer scintillator only in some parts of octants 4-7.

Layer vs Octant FAMUS N

Occupancy plot.

Layer vs Octant FAMUS S

Occupancy plot.



Muon Local Tracks (All)

Muons(LocalTracks)

N

The number of local muons of all kinds. This includes A-stubs, BC-segments, three layer tracks, etc.

Exchange 29-Apr-2003:
Question (HTD): How many kinds of muons are there here? How many ways can one muon be counted?
Answer (SSR): There are 7 kind of muons (depending on nseg).
For a detailed description, please have a look at Table 1 of D0note 4091.

PT

The pT (GeV/c) of all muons. This comes from the tracker if the muon is matched.
Otherwise it is the local muon pT. If the local fit was successful,
then the global pt is the result of the combination of both measurements
(dominated by the tracker measurement of course).

ETA

Eta of all muons. The boundary of the central muon system is between |eta| of 0.8 to 1.0 and is phi-dependent. The reason it is not at a fixed place is that the central muon system is rectangular sides of a box-shape. The boundary of the forward muon system is at |eta| of 1.6 to 2.0 for similar reasons.

Because physics (as opposed to detector) eta is plotted, the eta shown can be larger than the physics eta of the detector.

PHI

Phi of all muons. The periodic spikes are muons plotted at the centers of drift chamber (PDT and MDT) segments. There are fewer muons found in the plot between 4 < phi< 5, where the acceptance of octants 5 & 6 (bottom) is not as good as the rest of the detector.

CHISQ

The chi-sq of the local muon fit. Negative chi-2 for fits that don;t converge.

W HITS A

The number of PDT and/or MDT hits in the A-layer. Most of the A-layer has 4 decks. The central bottom has 3 decks.
Parts of octant 5 & 6 have no A-layer coverage at all.

Exchange 29-Apr-2003:
Question (HTD): Is this hits or decks?
Answer (SSR): Hits.

W HITS BC

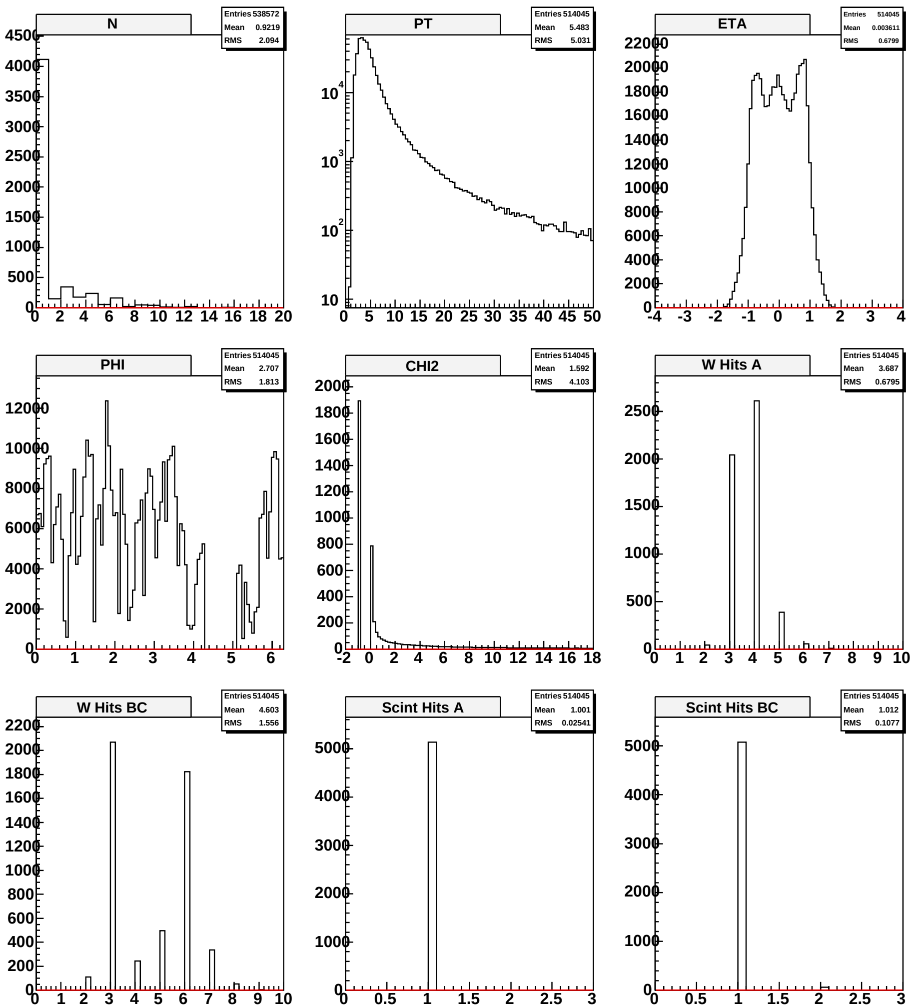
The number of PDT and/or MDT hits in the B and C layers, summed.
These chambers have 3 decks. The peak at zero is A-stubs.

SCINT HITS A

The number of A-layer scintillator hits.

SCINT HITS BC

The number of B + C layer scintillator hits. The central has, except in some special places, only one b or C layer of scintillator. The forward muon system usually has both.



Muon Local Tracks (MediumWamus)

Muon (Medium WAMUS)

A medium muon has at least one scint hit in A-layer, one scint hit in B or C layer, a 2+ wire hit segment in the A-layer and a 2+ wire hit segment in B&C layer. It doesn't necessarily pass the local track chi^2 cut.

N

The number of muon segments in the WAMUS system per event.

Exchange 02-Apr-2003:
Question (HTD): I don't really know if this is segments. I guess that because it comes peaked in 2's.
Answer   ():

PT

The pT (GeV/c) of all muons. This comes from the tracker if the muon is matched. Otherwise it is the local muon pT. If the local fit was successful, then the global pt is the result of the combination of both measurements (dominated by the tracker measurement of course).

ETA

Physics eta of central muons.

PHI

Phi of central muons. The narrow deficits are due to phi-cracks between octants. It's impossible to get a medium quality muon in part of octants 5 and 6. Thus the hole.

CHISQ

The chi-sq of the local muon fit.

W HITS A

The number of PDT hits in the A-layer. Most of the A-layer has 4 decks.

W HITS BC

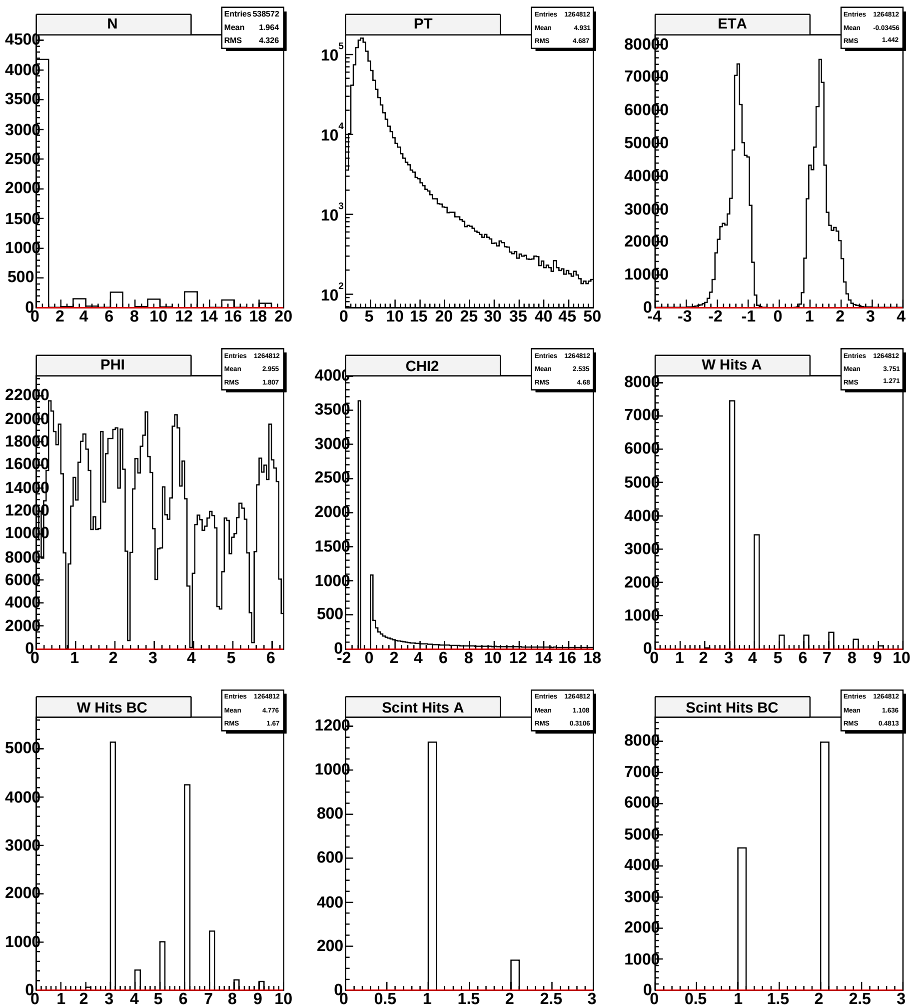
The number of PDT hits in the B and C layers, summed. These chambers have 3 decks. The peak at zero is A-stubs.

SCINT HITS A

The number of A-layer scintillator hits.

SCINT HITS BC

The number of B + C layer scintillator hits. The central has, except in some special places, only one b or C layer of scintillator. The forward muon system usually has both.



Muon Local Tracks (MediumFamus)

Muon (Medium FAMUS)

A medium muon has at least one scint hit in A-layer, one scint hit in B or C layer, a 2+ wire hit segment in the A-layer and a 2+ wire hit segment in B&C layer. It doesn't necessarily pass the local track chi^2 cut.

N

The number of muon segments in the FAMUS system per event.

Exchange 02-Apr-2003:
Question (HTD): I don't really know if this is segments. I guess that because it comes peaked in 3's.
Answer   ():

PT

The pT (GeV/c) of all muons. This comes from the tracker if the muon is matched. Otherwise it is the local muon pT. If the local fit was successful, then the global pt is the result of the combination of both measurements (dominated by the tracker measurement of course).

ETA

Eta of forward muons.

PHI

Phi of forward muons. The narrow deficits are due to phi-cracks between octants.

CHISQ

The chi-sq of the local muon fit.

W HITS A

The number of MDT hits in the A-layer. Most of the A-layer has 4 decks.

W HITS BC

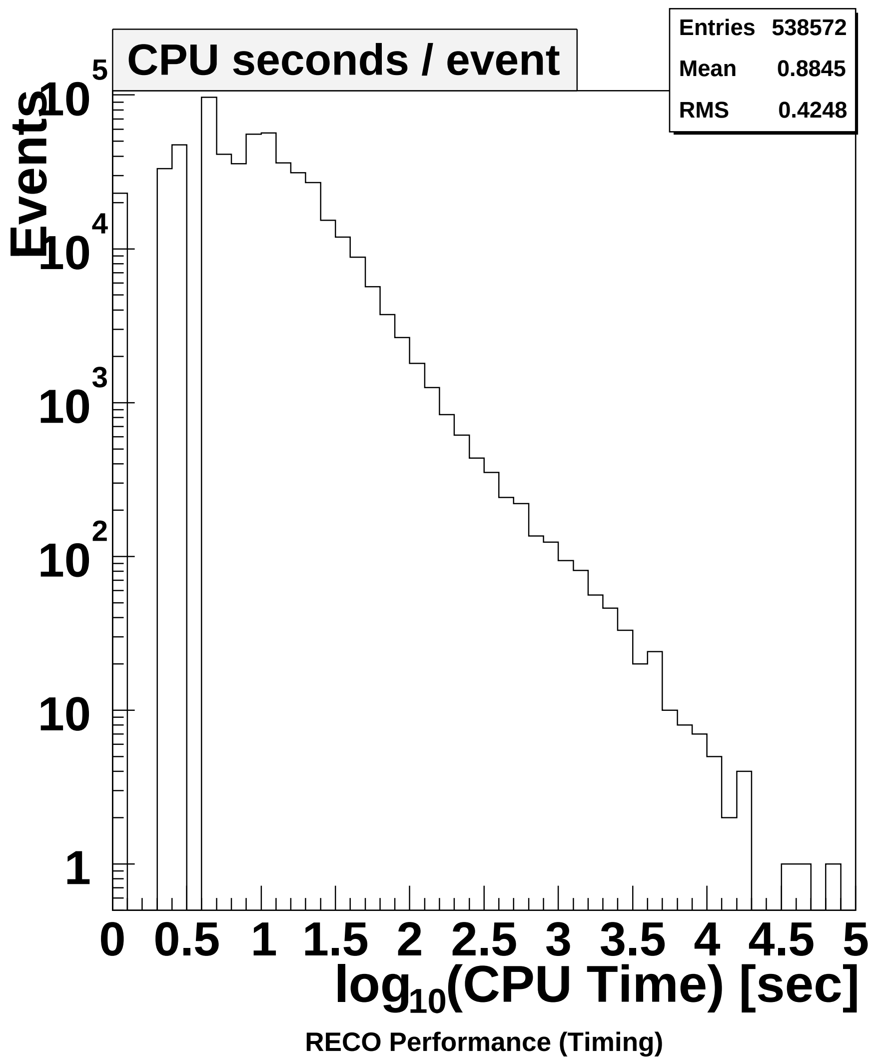
The number of MDT hits in the B and C layers, summed. These chambers have 3 decks. The peak at zero is A-stubs.

SCINT HITS A

The number of A-layer scintillator hits.

SCINT HITS BC

The number of B + C layer scintillator hits. The central has, except in some special places, only one b or C layer of scintillator. The forward muon system usually has both.



Reco Timing

CPU Seconds per Event

Fantastically interesting to study vs. integrated lum'y and as input to a MC model of the Farm. Anybody interested?